ORDNANCE

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THE MAGAZINE OF SCIENTIFIC AND INDUSTRIAL PREPAREDNESS

L. XXXIII, No. 173 • SECTION I • MARCH-APRIL, 1949

FOUNDED 1920

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IN THIS ISSUE

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THE JOURNAL
OF THE AMERICAN
ORDNANCE
ASSOCIATION
ASHINGTON, D. C.

LIEUT. GEN. JOHN E. HULL
Directs Weapons Systems Evaluation Group

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Founded 1920

ORDNANCE

Land • Sea • Air

Magazine of Scientific and Industrial Preparedness

THE JOURNAL OF THE AMERICAN ORDNANCE ASSOCIATION

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• Featured in this issue are the addresses of some of the principal speakers at the Industrial Preparedness Meeting of the American Ordnance Association held in New York City on December 6, 1948, in commemoration of Pearl Harbor Day.

The invocation delivered by His Eminence Francis Cardinal Spellman, Archbishop of New York, appears on the frontispiece. The addresses of Adm. Louis E. Denfeld and Charles E. Wilson are published on pages 318 and 320 respectively. The newly elected officers and directors of the A.O.A. are pictured on page 324, while on pages 325-327 is a pictorial and descriptive account of the entire proceedings.

• No sooner has one memorable gathering of the A.O.A. passed into history than another and even more momentous one begins to loom on the horizon. We refer, of course, to the Thirty-first Annual Meeting of the American Ordnance Association to be held in Los Angeles, Calif., next April 26th with a technical and scientific session at Long Beach the following day. For details of this gala affair (and the glories of Southern California) see pages 333-336 of this issue.

Reserve the dates now and plan to be with the Ordnance fraternity on the West Coast in April. California, here we come!

• This issue of ORDNANCE is published in two sections. Section II contains a complete and up-to-date roster of the officials of the national Association, the officers and directors of all the local Posts, and members of the various A.O.A. Technical Divisions and Committees. In the second section there also is published the Honor Roll of Industrial Preparedness which lists the more than 700 Company Members of the Association who are coöperating in our efforts to effect scientific and industrial preparedness for national security and peace.

—*The Editors*

A Program To Keep America Strong For Peace

TO KEEP ABREAST of the rapid and far-reaching advances in scientific and technical knowledge and their growing applicability to arms and to industry, the American Ordnance Association is devoting its energies to the following program for national security and peace:

To use all lawful means to ensure that the United States, its Government, Industry, and People

1. Strengthen in every way the close relationship among Science-Industry-Ordnance as indispensable factors of our national security and, to this end, foster close coöperation on the part of the Army, Navy, and Air Force with scientific and educational institutions.

2. Maintain a continuing national program of ordnance research and development, utilizing all facilities—governmental and private—for this purpose.

3. Inaugurate an annual ordnance replacement program to assure latest types of equipment for all our armed forces—ground, sea, and air.

4. Strengthen and increase in time of peace the fourteen decentralized Ordnance Districts.

5. Accumulate and maintain adequate reserves of strategic raw materials to safeguard our national security.

6. Preserve and strengthen our arsenals and depots—ground, sea, and air—to enable them, in coöperation with science and industry, to keep alive the knowledge of ordnance production and logistics in time of peace.

7. Train annually military and civilian personnel of the technical branches of the Military, Naval, and Air Forces in current industrial practices, and, similarly, train key scientific and industrial personnel in the technique of ordnance design, production, and logistics.

8. Establish and maintain Ordnance R.O.T.C. units at qualified educational institutions of our country and substantially increase the number of these units.

9. Educate all our people in the vital importance of planning not only for the mobilization of our national resources but also for their effective utilization wherever needed to keep war out of America.

10. Foster public interest in scientific, industrial, and military preparedness to keep America strong for peace ashore, afloat, and aloft.

A Guaranty of Peace

The American Ordnance Association, founded 1919, is a patriotic, educational, scientific, and nonprofit membership society of American citizens dedicated to scientific and industrial preparedness for the common defense as one of our Nation's strongest guaranties of security and peace.

AMERICAN ORDNANCE ASSOCIATION

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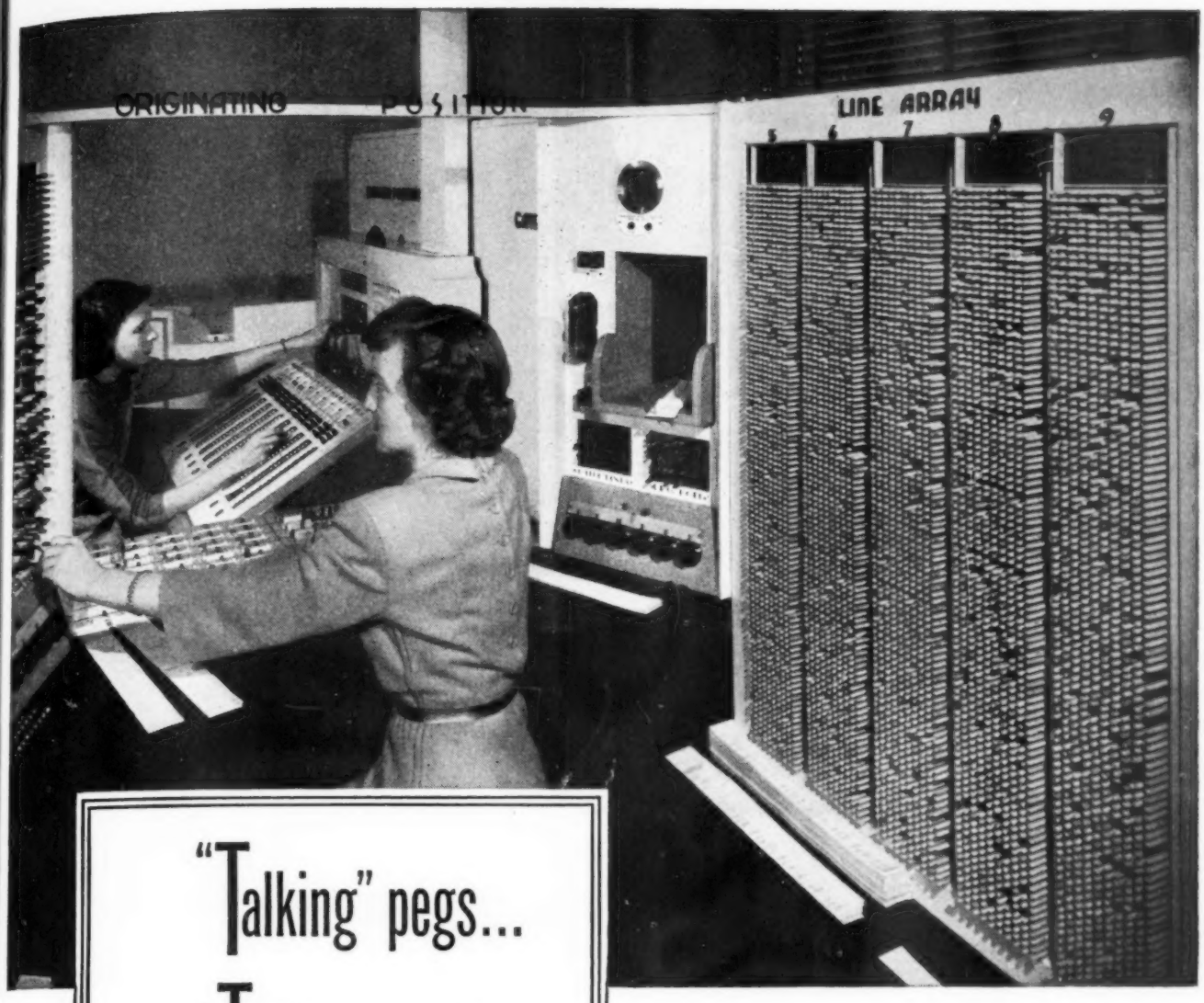

"Talking" pegs... and Talking people

THERE ARE 10,000 pegs in this machine, representing 10,000 subscribers in a crossbar telephone exchange—the latest switching system which handles dial calls with split-second swiftness.

The pegs represent many types of telephone users—two-minute talkers and ten-minute talkers . . . people who dial accurately . . . those who make a false start or two. They are starting a journey through a unique machine which analyzes the performance of dial equipment in a typical central office.

But while an actual crossbar exchange connects your call in a matter of seconds, this counterpart moves far more slowly. It gives the Bell Laboratories engineers who built it time to observe what happens to each call—where bottlenecks develop, which parts are overworked or underworked, which of the circuits are most used.

In a manual exchange, the number of operators may be changed to meet different traffic conditions. In crossbar, all switching is done by complex electro-mechanical devices, permanently built in. This machine shows how many devices of each kind there must be in a new exchange to give you the best of service with a minimum of expensive equipment.

This traffic-study machine is one of the many ingenious research tools devised by the Laboratories as part of its continuing job—finding new ways to give you better and better telephone service.

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New Developments

LAND

CHEMICAL WARFARE

New and more deadly war gases far more toxic than Lewisite or mustard are under test and development at the Army Chemical Center, Edgewood, Md., by the Chemical Corps of the Army, according to Hanson W. Baldwin of *The New York Times.* Edgewood research has progressed, with the German wartime "Tabun" or first of the "G" series as a base, to even more toxic gases. This series, also known as the "Green Ring Three," so-called because of the method of designation, comprises deadly "nerve" gases, which have been dubbed "psychological" gases because under certain conditions they might cause irresponsible behavior among victims. Small quantities of these gases inhaled or on the skin are lethal.

Difficulties in manufacturing new gases of such high toxicity are considerable, but the Germans made great quantities of "Tabun" during the war, a considerable amount of which, together with the manufacturing processes and the chemists who directed them, fell into Russian hands.

Biological agents, which are also the responsibility of the Chemical Corps, complicate the problem of defense and, although Edgewood is now conducting a school on radiological defense similar to one conducted by the Navy on the West Coast, there can be only limited protection against radioactivity.

Considerable Arctic and cold-weather experimentation is continuing. An Arctic gas mask has been developed and gases are being tested in frigid temperatures.

WIRE-MAKING MACHINES CACHED

A serious wartime bottleneck in the communications industry has been prevented through Army storage of four times as many field wire stranding and twinning machines as existed in the pre-war civilian economy, according to the Signal Corps. About 400 machines have been secured from the War Assets Administration under the Joint Army-Navy Machine Tool Program of the Munitions Board and have been stored in Signal Corps depots. Based on World War II experience, the availability of wire stranding and twinning machines will enable manufacturers to save many months in reaching mass production schedules in the event of another emergency.

NEW MILITARY TEXTILES

The Army recently disclosed a plastic body armor described as able to stop a caliber .45 revolver slug. Other recent Army textile discoveries included: A new lightweight Arctic clothing ensemble that gives protection in 55-below-zero weather; a new fabric, "sewed with cement," which permits body vapor to escape yet keeps the wearer dry from rain or snow; a fireproof fabric, and still another fabric that wears twice as long as average material; a new nylon sock, so long wearing it will save the Army alone a million dollars a year, as well as a shrink-resistant sock; and a new wool-nylon flag that will outlast all-wool flags three to four times.

JET PROPULSION CENTERS

Establishment of two national centers of rocket and jet-propulsion study and research, to be located at Princeton University in the East and California Institute of Technology in the West, was announced recently. Hailed as a major stimulant to

CONTINENTAL
Red Seal
ENGINES

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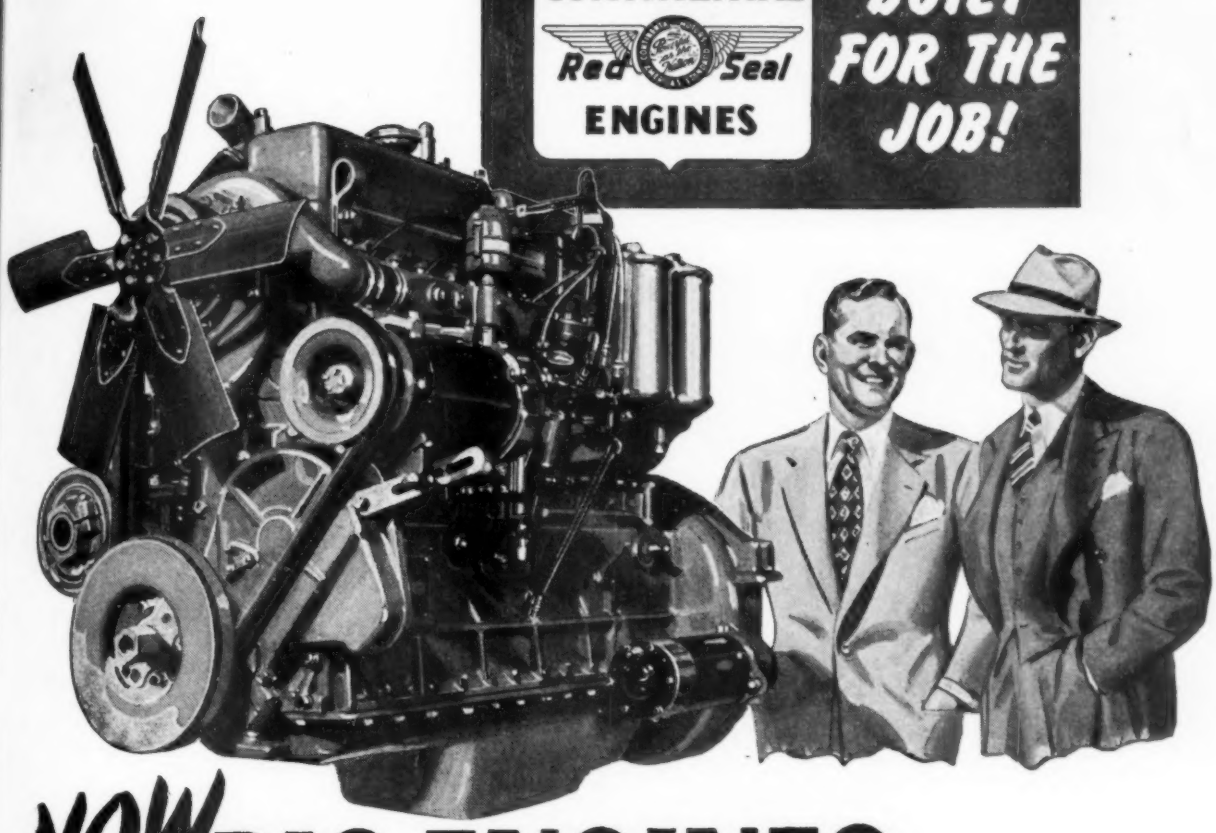

NOW BIG ENGINES DESIGNED FOR TRANSPORTATION

R-6602:	200 h.p. at 2600 rpm.
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R-6513:	170 h.p. at 2600 rpm.
B-6427:	130 h.p. at 2600 rpm.
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M-6330:	105 h.p. at 2800 rpm.
M-6290:	95 h.p. at 2800 rpm.
M-6271:	90 h.p. at 2800 rpm.
F-6226:	75 h.p. at 3000 rpm.
F-6209:	70 h.p. at 3000 rpm.
F-6186:	60 h.p. at 3000 rpm.
F-4162:	55 h.p. at 3000 rpm.
F-4140:	50 h.p. at 3000 rpm.
F-4124:	45 h.p. at 3000 rpm.
Y-4112:	40 h.p. at 3000 rpm.
Y-4091:	35 h.p. at 3000 rpm.
Y-4069:	25 h.p. at 3000 rpm.

Big, new, high-speed engines delivering up to 250 h.p. have recently been added to the Continental Red Seal line. These new models are of post war design and incorporate many advances in engineering, in materials, and in manufacturing technique. Their improved power characteristics and higher governed speeds make possible faster on-time schedules for trucks and buses. These engines have already proved their efficiency and reliability in millions of miles of use.

Bulletins are available giving further information on any of the engines listed at the left.

Continental Motors Corporation
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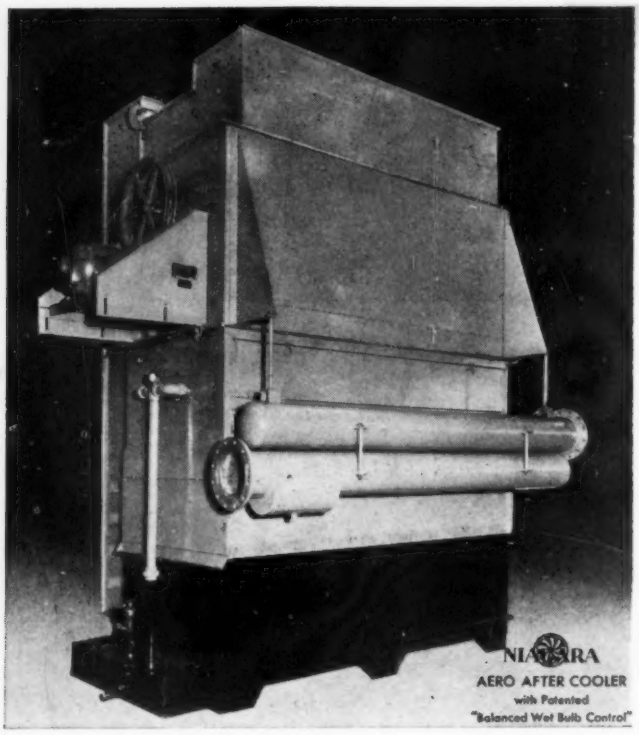

How to PREVENT CONDENSATION in COMPRESSED AIR LINES

● Users of pneumatic tools and machinery spend thousands of dollars on repairs and suffer much interruption to production from the condensation of water in their air lines. In compressed gas systems and in processes where compressed air is blown directly on parts and materials, there is additional damage.

You can prevent these losses by installing a Niagara Aero After Cooler. It cools the compressed air or gas by evaporative cooling and removes the water before the air enters the receiver. This method brings the air to within a few degrees of the wet bulb temperature, making certain that your compressed air will always be colder than the atmosphere surrounding the lines in your plant, so that no further condensation can take place.

Savings in cooling water pay for the installation. Experience shows that the patented Niagara evaporative cooling method consumes less than 5% of the water required for cooling by conventional means. You save the cost of the water, the cost of pumping it, the cost of disposing of it. These extra savings soon pay for the Niagara Aero After Cooler.

Write for Bulletin No. 98

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New Developments

the development of rockets and jet propulsion and one of the most striking postwar developments in engineering education, the new institutions will be known as the Daniel and Florence Guggenheim Jet Propulsion Centers. Each will provide facilities for postgraduate education and research in jet propulsion and rocket engineering. They will emphasize particularly the development of peacetime uses of rockets and jet propulsion.

SIDEBAND RECEIVER

The "single-sideband receiver," designed by Donald E. Norgaard of the General Electric Laboratory, uses an electronic principle which doubles the number of broadcasts usually accommodated by a given radio band. Moreover, a transmitter using this principle has eight times the broadcast strength of present-day stations using the same power, it is claimed.

Basis of the new system is the fact that present-day radio signals travel in two "sidebands" along a "carrier wave" which does not carry the message. Only one sideband is needed to carry a broadcast, and, under some conditions, the two sidebands interfere with each other to cause severe distortion. Moreover, it is often the case that there is a disturbance on one sideband while the other is perfectly clear. By using only one sideband instead of the usual two, it has been possible to transmit and receive clear signals over great distances without many of the types of interference experienced by operators of standard equipment.

ELECTRONIC COMPUTERS

Possible uses for electronic computers in the military services will be looked into by a special committee which has been organized by the Munitions Board, National Military Establishment. The Board is particularly interested in the possibility of using the computers to shorten the time now required by the military services to make computations of man-power and material requirements necessary to carry out plans of the Joint Chiefs of Staff. These compilations deal with millions of items and now require months of hand work. When the calculations are completed, they then go to the Munitions Board, which looks at them from the standpoint of the ability of industry to produce the material needed.

STANDARDIZED CLOTHING PLANNED

A committee composed of top-ranking Army, Navy, and Air Force officers with authority to make final decisions for their departments is working on the standardization of clothing and personal equipment for the armed forces.

An exhibit of 400 items of clothing and personal equipment, representing a total cost of nearly $247,000,000 for all armed forces requirements during the fiscal year 1949, has been set up by the three Departments at the Army Quartermaster Depot near Alexandria, Va., to assist the committee and its technicians in making selections for standardization. The exhibit consists of such items as undershirts, belts, fatigue uniforms and caps, boots and shoes, stockings, socks, blankets, flying equipment, goggles, nurses uniforms, and a wide variety of other clothing and equipment. Each item is tagged with complete information as to its use, specifications, cost, annual gross requirements per 100,000 troops, and how it differs from items of the same type.

SEA

HEAVIEST CRUISER JOINS FLEET

The United States Navy cruiser DES MOINES, rated as the world's most powerful, is the first of a new class of heavy cruisers and carriers having the first completely automatic rapid-fire battery of nine 8-inch guns. The vessel has a speed

Nothing Rolls Like a Ball

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"in excess of thirty knots." The automatic firing feature eliminates ammunition handling—one of the most dangerous and difficult phases of naval warfare.

In addition to the 8-inch battery, the DES MOINES has a secondary battery of twelve twin-mount, 5-inch guns, an anti-aircraft battery of twenty twin-mount, 3-inch guns and twelve 20-mm. machine guns.

24-INCH GUN

A 24-inch test gun, largest known gun of its type, has been placed in operation at the Naval Proving Ground, Dahlgren, Va., to test bombs and guided-missile war heads and their fuzes. The new gun will shoot bombs and war heads as heavy as 2,000 pounds against armor plate and concrete targets at supersonic velocities. The effect of the impacts on the missiles and their components will be measured and analyzed, permitting the armed forces to expand their development of ordnance testing.

SUBS MAY GUIDE MISSILES

The problem of undersea warfare, both offensive and defensive, is "the priority item" in Navy planning, according to Adm. Louis E. Denfeld, Chief of Naval Operations.

"Our modern, high-speed submarines," he said, "can operate with the fast carriers, cruisers, and destroyers to much greater advantage" than could those of World War II. In any future war the Navy can "conceive" submarines being used as direction finders for guided missiles launched from carriers. The submarines will be "carefully spaced between launching area and the target, to act as direction finders for the missiles."

NEW ENGINE FUEL

Hydrozine, a motor fuel made of air and water, is being developed by the Navy. Its molecule is almost the simplest possible combination of the two basic elements, hydrogen and nitrogen. Hydrozine is considered to be an opening step toward becoming independent of carbon compounds, such as gas and oil, in some special fields of motor fuels.

RESCUE BOAT PROGRAM STANDARDIZED

The Navy and the Air Force have reached an agreement on standardization of rescue boats. A result of unification, the agreement provides a world-wide program of joint procurement, supply, and maintenance of the two services' rescue craft. All Air Force commands adjacent to water maintain rescue boats, a service which is an individual command responsibility. The new program is designed to augment the Air Rescue Service to accomplish marine-rescue requirements of the Air Force. Standardization provides for common use by the Navy and Air Force of rescue-boat engines, parts, and supplies. The Navy's Bureau of Ships is now charged with all procurement, design, maintenance, repair, and supply for both services.

NEW LORAN

A new loran receiver-indicator using miniature tubes has been put into quantity production by Sperry Gyroscope Company. Of compact design, the long-range, electronic marine navigational equipment may be mounted on shelf, table, or deck. This Mark 2 loran incorporates six important improvements: its small size and use of a separate power unit suits it to vessels with limited space; trunnion mounts permit tilting of the receiver-indicator to suit the operator; large numbers make the time-difference meter easy to read; a motor-driven phase-shifting circuit plus continuous coarse and fine delays simplifies and speeds operation; an automatic frequency control keeps the pulses locked on the operating portions of the sweeps; and "black light" illuminates the panel without interfering with night vision. With loran, skippers within range of shore-based transmitters accurately fix

Good brakes are good business for one truck or one hundred

When your business runs on wheels, good brakes are just good sense. It comes down to the important fact that brakes are one place you can't afford to economize. That's why experienced trucking men install Bendix-Westinghouse Air Brakes. Their records show that in addition to assuring greater safety, the extra efficiency of Air cuts costs to the bone on brake maintenance. This adds up to real cash savings. It means savings in time, too—valuable time trucks can spend hauling profitable loads. Check the facts and you'll agree that Bendix-Westinghouse Air Brakes are more than just good sense. They are a solid business asset.

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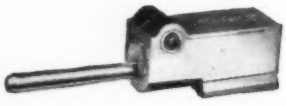
At right—Internal Comparator Attachment No. 952.



At left—Signal Light Attachment No. 958.

At right—Gage Head Cartridge No. 953 for mounting in jig or fixture.

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their positions at sea in less than five minutes independently of celestial observations.

AIR

RADICAL JET FIGHTER

A new 600-mile-an-hour jet fighter, designed specifically for high-altitude interception work, has been built for the Navy by the Chance-Vought Corporation for carrier operation. The new plane, designated XF7U-1, in reality a flying wing, has two verticle stabilizers and rudders located at the trailing edge of the wing. Lateral and longitudinal control, however, are obtained through the use of a pair of "ailevators" which combine conventional ailerons and elevators. Powered by two Westinghouse turbo jets, implemented by afterburners for quick bursts of speed, the plane has an exceptional rate of climb.

NAVIGATION TRAINING PLANE

A C-54 Skymaster 4-engined transport, specially modified for the USAF Bombardment School and the only one of its type in existence was delivered to the school recently from the Middletown Air Matériel Area, Pa.

The training ship is equipped with twenty-one student positions, each including table, chair, safety belt, and lamp. For every two positions a navigation instrument panel is installed, containing an altimeter and gyrosyn compass, as well as a true airspeed indicator, a device with which few Air Force planes are provided. The aircraft is equipped with seven Loran sets, four radio compasses, and four radar altimeters.

C-122 LIGHT TRANSPORT

The first of three experimental all-metal twin-engined C-122 "attack transport" craft has successfully completed its initial test flight. The new plane, a high-performance powered version of the CG-118 glider, has been built to Army and Air Force specifications for economical transport of troops and equipment into forward areas, where prepared landing strips are not readily available. Representing Chase Aircraft's fourth cargo transport in six years, the C-122 is designed to carry a 10,000-pound payload and cruise at 200 miles an hour. It is powered by two Pratt & Whitney R-2000, 1,350-horsepower engines.

NEW SONIC PLANE

The Northrop X-4, the USAF's latest jet aircraft built to explore the high subsonic speed zone, made its first test flight recently. Chief identifying characteristic of the X-4 is its lack of a conventional horizontal stabilizer. Instead, it has only a single vertical fin. A broad, flat swept-back wing incorporates the horizontal stabilizer functions in much the same manner as does the "Flying Wing," now being produced in quantity for the Air Force. The X-4 is powered by two jet engines.

4,000-HORSEPOWER ENGINE

Development of an aircraft power plant which delivers more than 4,000 horsepower to a propeller, as well as several hundred pounds of jet thrust, was announced recently by the Air Force. Known as the Wasp Major-VDT, the new piston-jet propulsion combination consists of a 28-cylinder Pratt & Whitney Wasp Major engine and a 2-stage General Electric variable-discharge turbosupercharger. The VDT power plant enables heavy, long-range aircraft to fly farther, faster, and higher, and also enables planes to take off with heavier loads of cargo, fuel, or bombs.

B-47 "STRATOJET" DELIVERED

The U. S. Air Force accepted delivery of its first Boeing B-47 "Stratojet" bomber following Air Force acceptance tests at Moses Lake Air Force Base, Wash. The swept-back-winged plane is powered with six General Electric-Allison J-35 jet

Spicer Power Transmission Equipment is used in a large majority of the *trucks* being manufactured in America.

Spicer has over 45 years experience in the design, development and manufacture of Universal Joints, Propeller Shafts, Axles, Clutches, Transmissions and Auxiliaries. Spicer developed the Universal Joint for automotive use, and has made many other distinctive advancements in the industry. Spicer engineers will work with you on the adaptation of Spicer Power Transmission Equipment to your particular needs.

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assures economy

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Fuel	13.5%
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engines producing a total of 24,000 pounds' thrust. Eighteen JATO units provide 18,000 pounds of auxiliary thrust. The plane has a design gross weight of 125,000 pounds and a service ceiling of over 35,000 feet. The B-47 is in the 600-mile-an-hour class, has a combat radius of over 800 miles, and carries a bomb load of more than 10 tons. It has a wing span of 108 feet, a length of 116 feet, and is 28 feet high.

TURBO JETS FOR THE B-35

The United States Air Force is converting ten B-35 "flying wing" aircraft from reciprocating engines to turbo-jet engines. This modernization is now in progress at the Northrop Aircraft Plant at Hawthorne, Calif. The other three of the thirteen B-35-type planes which were produced by Northrop will continue to be used for static tests and further flight testing.

SUPERSONIC PARACHUTE

A supersonic parachute, capable of lowering delicate research instruments from rockets shot into the upper atmosphere, has recently been developed. Known as a "rotochute," the device resembles a giant dart with a whirling propeller on its tip. It can carry a 20- to 30-pound load of instruments. The most successful rotochute thus developed is about four feet long, eight inches wide. Its propeller or "vanes," when fully opened in flight, extend about eight feet.

The rotochute, with instruments enclosed, is carried to the upper atmosphere inside a rocket. At the peak of the rocket's flight, the rotochute is expelled. As it falls and the air becomes denser, its blades begin to revolve and are gradually forced out into a horizontal position. This acts as a brake, and the device is slowed from supersonic speed to about twenty-seven miles an hour.

Engineers first became interested in the project because of the need for a device which could gently lower delicate equipment from great heights without damage. Ordinary parachutes were ripped to shreds when they encountered the denser air at supersonic speeds in their fall from the upper atmosphere.

Twenty-three different designs of rotary-wing air brakes were tested, and more than 200 drop tests were made during a year of intensive investigation before the present type of supersonic parachute was evolved.

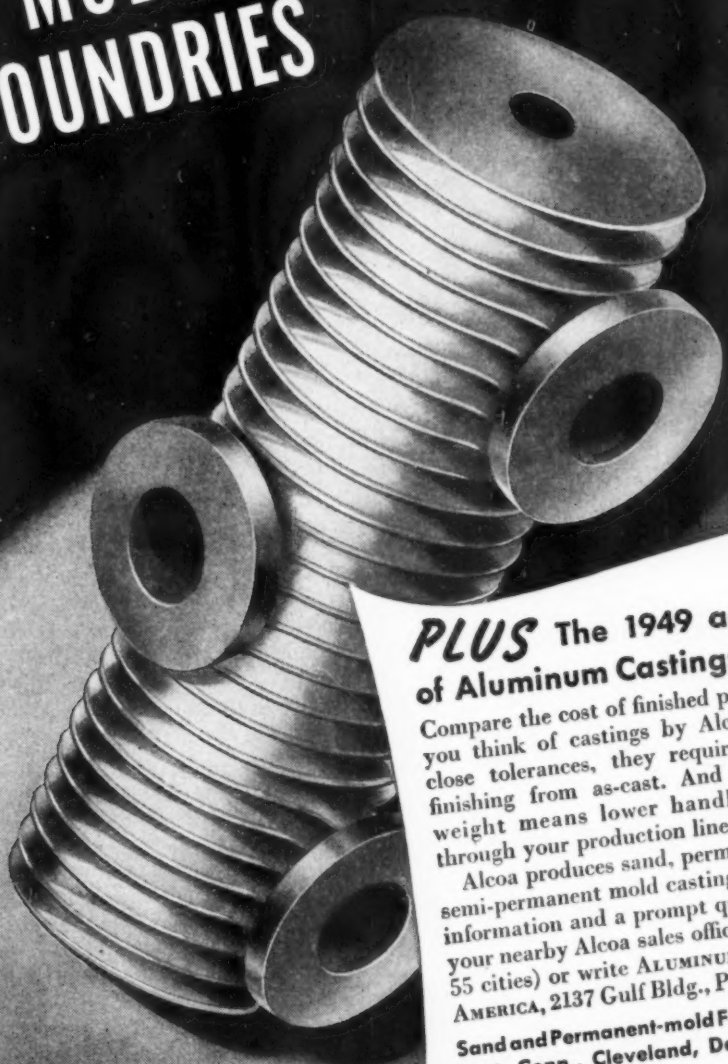
COMMUNICATIONS ON WHEELS

The 25th Communications Squadron of the United States Air Forces in Europe has built a unique and highly mobile signal center. Ten men of the squadron secured eight unserviceable vans from a salvage yard and put them into condition. Then they modified stock signal equipment and rubber-cushioned it against road shock. The result, after two months' work, is a mobile signal center capable of becoming fully operational within thirty minutes after arrival at any site and of handling all the signal needs of a headquarters. One van is a telephone switchboard central that can handle 480 different telephones; one is a teletype office with 5 teletype machines; the third is a carrier station to transmit all teletype and telephone messages by wire or high-frequency radio; and the fourth is a message center.

"DROPSONDE"

The Air Weather Service has adopted a new instrument for gathering weather data from weather reconnaissance planes. The new device, unofficially designated the "Dropsonde," is a radio recording instrument attached to a parachute. When it is dropped from an aircraft it radios the temperature, barometric pressure, and relative humidity of the atmosphere to the aircraft. Teamed with the weather reconnaissance planes, the Dropsonde makes it possible to gather accurate weather data from water areas, uninhabited land areas, and from high altitudes.

8 MODERN FOUNDRIES



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Atomic Energy

MARINE ATOM ENGINE

The Atomic Energy Commission recently announced plans for building an experimental nuclear reactor or uranium furnace to meet specifications for eventual use in powering ships. The function of the uranium furnace is like that of the firebox of a boiler, except that it consumes uranium instead of coal.

At Pittsburgh, Charles H. Weaver, head of Westinghouse's newly formed atomic power division, said work on the atomic engine would start "within the next few months."

"Construction of the nuclear reactor marks the beginning of the development of atomic power in the transportation field," he added. "Our efforts, however, will be directed solely toward putting the reactor in a ship. We're trying to build a ship's power plant that will burn uranium instead of coal or oil."

AUSTRALIAN URANIUM FIELDS

Uranium ore fields in South Australia are proving more extensive than early reports indicated. At East Mount Painter a large amount of ore has been taken out for assay. At Radium Hill, to the southeast, four lodes are clearly defined. Samples from eleven holes at Radium Hill have proved richer than any discovered so far at East Mount Painter. Mount Painter is in the Flinders Range about 450 miles north of Adelaide, Australia.

LARGEST ATOM SMASHER

The Westinghouse Electric Corporation is building electrical equipment to help pack a six-billion electron-volt "knockout punch" into the world's most powerful atom smasher and enable scientists to carry out studies in the uncharted realm of cosmic rays. Valued at approximately $1,000,000, the electrical apparatus will be installed on the $9,000,000 "racetrack atom smasher" to be built on the Berkeley campus of the University of California.

The new machine will be seventeen times more powerful than the University's present cyclotron, which is the largest known to exist today. It is being constructed with funds provided by the Atomic Energy Commission under its pure-research program.

The heart and nerve center of the new atom smasher will be the electrical equipment, consisting of two alternating-current motor-generator sets, ignitrons to change alternating into direct current, and a network of controls and meters to channel the power into a giant 10,000-ton circular steel magnet.

The big motor-generator sets and ignitrons will be built at the Westinghouse East Pittsburgh, Pa., plant; smaller motors and controls will be constructed at Buffalo, N. Y.; transformers will be made at Sharon, Pa.; and the Newark, N. J., plant will build the meters.

In a rectangular "tunnel" in the giant magnet, subatomic particles, called protons, will be accelerated by electrical "kicks" until they travel at nearly the speed of light—180,000 miles a second. The protons then will be "fired" into a block of graphite, or compressed gas, smashing the atoms in the material and releasing electrons, neutrons, protons, and mesons which make up the atoms. These can be photographed for later study.

Through such studies, scientists hope to find out what holds an atom's nucleus together and whether matter can be created from energy.

To keep the proton "bullets," on their course, the two motor-generator sets together will develop a peak of 100,000 kilowatts of power.

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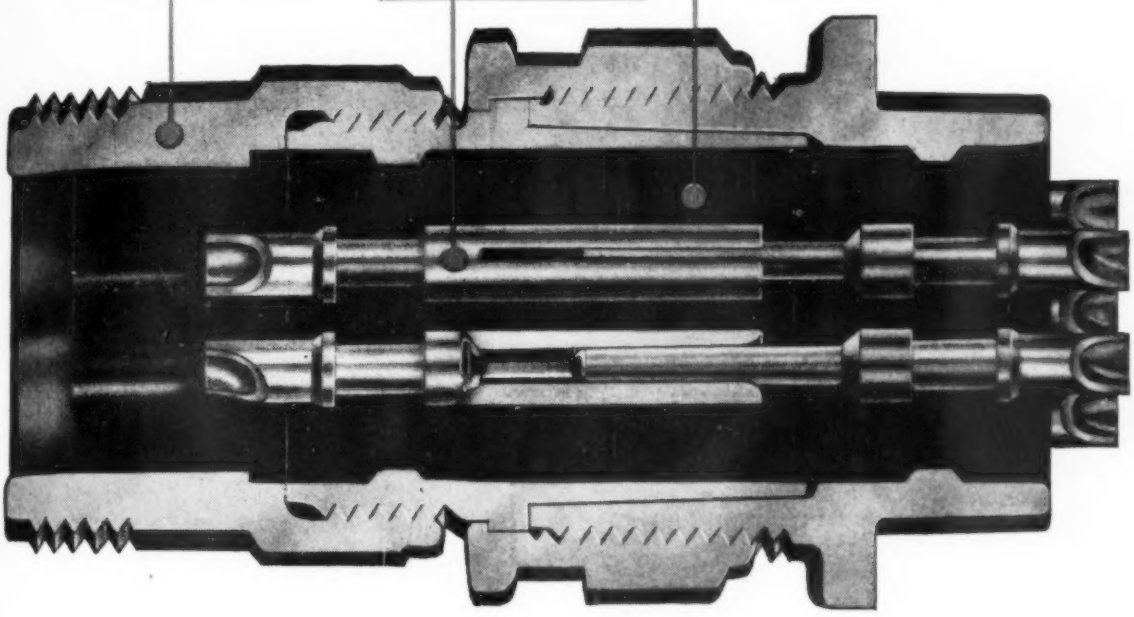

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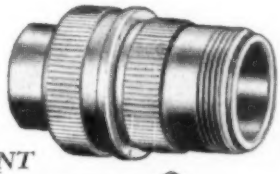

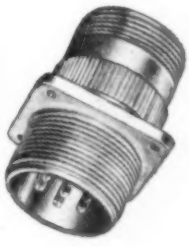

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Faith Is America's Might!

THE purchase price of peace for which we give Thee thanks, O God, is the spilled blood and broken bodies of a million of our men. On the altar of their sacrifice we commend their immortal souls to Thy mercy and pleadingly we pray, as do our dead from out their muted lips, that the soul of their America and ours may be purified, protected, and preserved, and that we may soon secure the peace which they bought for us with their own young and precious lives. Fervently we beg Thee, O God, to grant that their crucifixion may serve to be the resurrection of the soul of America, and that with malice toward none and charity to all we may stand forever united and on guard against those who would defile and destroy America's ideals and imperil her liberty!

¶ For we are heirs of the God of freedom! Free men by the will of God and free men we shall always be—or die mingling our blood with the blood of our sons. We dare not be traitors to their sacred trust—our Nation's heritage and the world's hope. We dare not barter liberty for lunacy, defying God Who from Mount Sinai flashed His will to be free through sinless sons living by His ten laws. We dare not play false to the trust of the American patriots who framed the Bill of Rights on the wall of history!

¶ We are free men with the right to be free to utter speech in good spirit and reason, defending our American way of life; free to adore the true God, loving His heart and believing His mind; free to overcome want for body and soul by sweat of the brow in gainful pursuits; free to conquer fear of losing God-given rights through godless laws and ungodly foes. Our rights are ours by right Divine, eternal to have and to hold against all aggression; to be cherished, not as grants by law or gifts of men of power, for we are free men because God is free—and we are His image and likeness!

¶ Liberty is America's beacon flaming from every hill and spire; America's pledge to peoples yet unborn to pass on God's torch of freedom, its light undimmed by the mock-light of atheist minds. Liberty is America's glory for in this land liberty was born, in this land freedom to exercise God-given rights was won, in this land hunted minorities found haven and homes, in this land enterprise and labor have prospered. Liberty is God's gift to America, and faith in God is America's might!

¶ This gift of faith, as a magic key, opens for men a vista star-illumed—a pathway through this valley of unrest, a gateway unto hills of high desire. And they alone are blind who will not see, they alone are bound who bind themselves. They only are free who freedom share in love and reverence with their fellowman and live the precious heritage of faith in image of the Child Who came on earth, and soon will come again a Mighty Conqueror yet still a child, whose weapon is but love. And He shall reign when hatreds forge no more the chains of nations and sickles reap alone the fruits of peace!

¶ Then shall we see His face break, as the morning breaks, upon our starless, prayer-sustained night; and in His face the beauty we have sought, and in His heart the love we hunger for, and in His arms the peace for which we, and all the world with us, have sought so long—this peace we pray shall come to be, at last!—*Invocation of His Eminence Francis Cardinal Spellman, Archbishop of New York, at the Industrial Preparedness Dinner Meeting of the American Ordnance Association, New York City, December 6, 1948.*

Evaluating Our Weapons

New Master Unit To Coördinate Defense

THE Weapons Systems Evaluation Group, created recently by Secretary Forrestal after a six months' study by the Joint Chiefs of Staff and the Research and Development Board, will be responsible for the technical and operational evaluation, on an interservice basis, of present and future weapons and weapons systems under probable future combat conditions. The evaluation is to be prepared by the ablest professional minds, military and civilian, and the most advanced scientific analytical methods that can be brought to bear upon our gigantic defense problems.

Secretary Forrestal considers the formation of the group "one of the most interesting and significant accomplishments in the work of unification of the military services. This is not a supplanting of the military judgment by scientists but rather a marriage between the two professional capacities and abilities."

During the past two years, scientific and military planners have given extensive thought to the problem of evaluating both existing and future weapons systems on an over-all basis. The problem was brought into sharp focus by the National Security Act of 1947 which created a compelling need for impartial scientific evaluation of weapons and weapons systems in a national sense.

Our defense program in the past has suffered from the lack of an adequate mechanism for evaluating scientifically the relative merits of various military programs and weapons systems, present and future. It is true that within each of the three services evaluation groups were engaged in studying weapons and systems of weapons, but there was no agency capable of applying this same type of thinking to interservice problems.

Although present evaluation groups within the National Military Establishment may be impartial as far as questions within their services are concerned, they must inevitably become protagonists in questions involving interservice matters. Thus evaluations prepared by groups within the services were sent up to the Joint Chiefs of Staff or the Research and Development Board; but in neither of these agencies has there been the mechanism for scientific evaluation whereby the relative merits of alternative or conflicting elements could be appraised or where further synthesis and estimates of interactions could be studied.

Evaluations by the individual services may be based upon quite different assumptions. We believe that a broader scientific evaluation procedure will aid in the resolution of questions involving interservice emphasis and will also disclose deficiencies in our national-security program which might be corrected by intensive research and development.

This review and comparison will not be a substitute for studies in the individual services, but it is an essential further step before the Joint Chiefs of Staff or the Research and Development Board can be in a position to render wholly objective judgment.

According to Secretary Forrestal, such over-all scientific review and evaluations could not be accomplished for two reasons:

"First, in the National Military Establishment there was no organization at the interservice level with appropriate personnel to undertake such studies; and, secondly, the assignment of clear responsibility for these broad analyses had not yet been made."

THE problem of national security is so serious that every reasonable effort must be made to get the best answers by the application of the scientific method. If we are to exploit fully the power of modern analysis, scientific methods for examining the nature of future war should be employed in the broadest possible sense.

The work of Lieut. Gen. John E. Hull's evaluation group will not be war planning but rather the preparation of certain elements for use in war planning. The important function of General Hull's group will be to apply the scientific method to the resolution of deeper questions leading to the formulation of plans for war. Effective war planning cannot be done in the modern world without the full utilization of this approach.

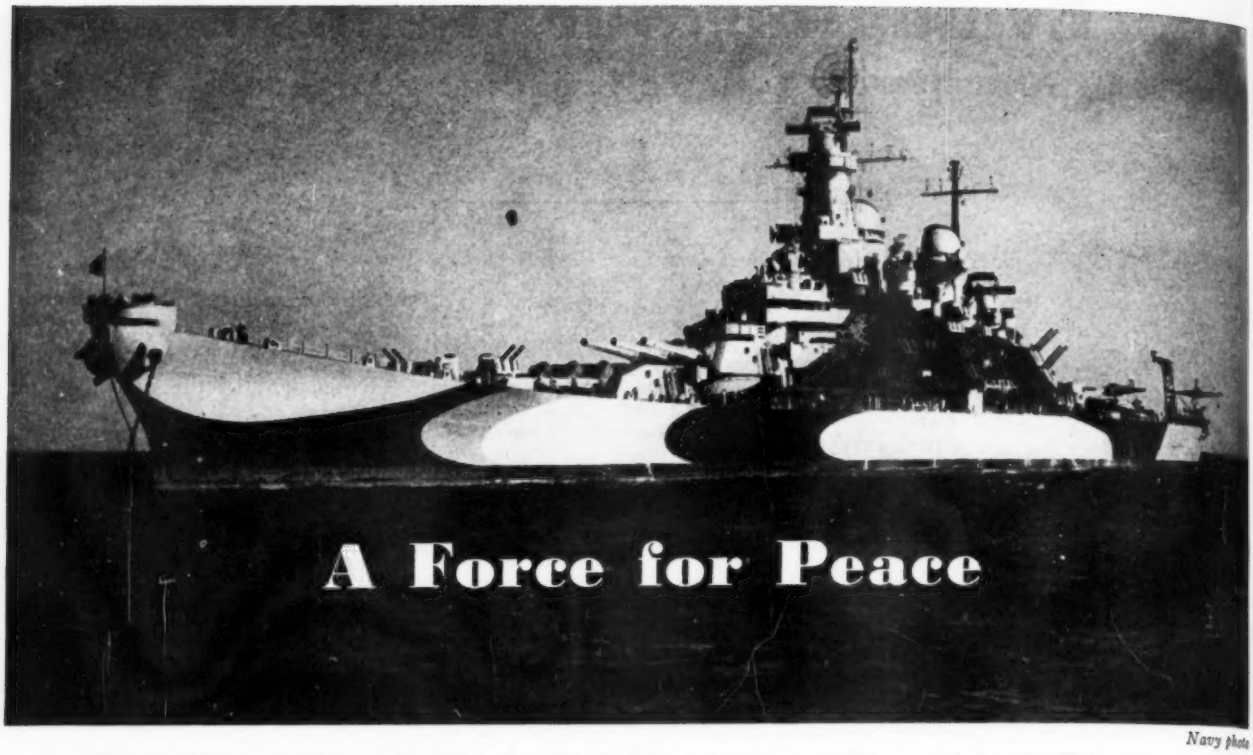
Lieut. Gen. John E. Hull, recently appointed director of the new Weapons Systems Evaluation Group of the National Military Establishment, was formerly Commanding General, United States Army, Pacific, with headquarters in Hawaii.

General Hull was born at Greenfield, Ohio, in 1895. A graduate of Miami University, he was appointed a second lieutenant in the Infantry Reserve in 1917 and was called to active duty the same day. Assigned to the 58th Infantry, he went to France with that regiment and subsequently saw action in both the St.-Mihiel and Meuse-Argonne offensives.

In the postwar era he was graduated from the Infantry School at Fort Benning, Ga., the Command and General Staff School at Fort Leavenworth, Kans., and the Army War College in Washington. In addition to routine regimental assignments, he was professor of military science and tactics at the University of Wisconsin and the University of Louisiana.

In 1941 General Hull was assigned to the War Plans Division of the War Department General Staff. In the following year he became chief of the European Section, Operations Division, and later was charged with the responsibility for handling operational matters for all overseas theaters. In 1944 he became Assistant Chief of Staff for Operations.

In 1946 General Hull became Commanding General, U. S. Army Forces, Middle Pacific, and Commanding General, Hawaiian Department. As a special assignment he commanded Joint Task Force Seven (Operation Sandstone) that conducted a series of tests of atomic weapons during April and May of last year. His photograph appears on the front cover of this issue.—THE EDITORS.



A Force for Peace

Navy photo

The Navy Symbolizes U.S. Power in Troubled Waters

by

Adm. Louis E. Denfeld, USN
Chief of Naval Operations

"Our power in any shape becomes a shield against aggressors opposed to universally accepted concepts of peace"

IN these days when man's capacity for destruction has increased many thousandfold, it is expedient that we be fully conscious of the forces we control. We retain an effective portion of that armed might which won a global conflict, and we possess the most powerful weapon the world has ever known. It is not by the possession of these forces, however, that we are measured as a great power.

It is our objective—not the means of its accomplishment—to which the world turns its attention. We must demonstrate to an apprehensive family of nations that our objective is in the preservation of liberty and independence; that our power is a force for peace.

The emergence of a United States supreme and dominant on land, sea, and in the air could understandably inspire universal envy and fear which might culminate in a general combination of the world against us. It is only by the greatest tact, by demonstrated friendliness, and by the obvious intent to harmonize our policies with all humanity, that we will give our less powerful neighbors confidence in our purpose.

It is essential to a relationship of mutual respect that we promote and maintain the independence of all nations. We have demonstrated the sincerity of our belief in that position. The postwar world might be unhappily different today if we had failed to assume that moral and material responsibility. The Marshall Plan is a case in point.

Effect of Naval Forces

But, at the same time, our naval forces in the European, Mediterranean, and Far Eastern waters are necessary stabilizing forces in those areas of political insecurity and potential aggression. The American flag on American ships is an enduring symbol of our historic interest in the independence of other nations. It is especially effective because the Navy does not have to trespass upon the territorial integrity of those we seek to reassure.

Unfortunately, it is not enough merely for us to reassure an apprehensive people. There are forces in the world today that deny that self-interest can be best served by subscribing to the common good. They seek an extension of individual power. The implication of this challenge cannot be ignored and we must remain strong to meet it. The maintenance and especially the development of the armed forces can never again be allowed to fall to the level where our own national existence is endangered.

As a maritime nation, a major portion of our strength must be placed in naval defenses. The seas are great mobile highways that we may use in both directions in peace and in war. But the seas become a barrier only when they are defended by a powerful navy.

Since it is axiomatic that the United States does not intend to fight a war on its home soil, we must carry the war to our enemies. That means we must cross the seas. To this end we must take every advantage of our power at sea in an offensive as well as a defensive sense.

Admiral Denfeld delivered these remarks at the Industrial Preparedness Dinner Meeting of the A.O.A. at the Waldorf-Astoria Hotel, New York City, December 6, 1948.

Should another war come, the destruction of enemy submarines will have a number-one priority. The problems of combating these elusive craft are many, but the Navy is developing devices to detect and destroy the modern submarine. I assure you, the situation is well in hand.

Submarine Warfare

This emphasis on submarine warfare is recognized not only in our Navy Department but by the naval staffs of other countries. For instance, our ally in the last war—the Soviet Union—is in the midst of an enormous submarine-building program. It is estimated that she now has a fleet of over 200 modern submarines, a goodly percentage of them being the most advanced schnorkel type.

Because I consider it mandatory that this country build up her own underseas fleet to be second to none, it might be appropriate to mention some of the tasks that would be assigned to our own submarines in the event of war. First of all, they would go after the enemy's shipping which would be considerable in spite of the fact that any probable enemy would again be predominately a land power. In addition, submarines would be assigned to radar picket duties. They would serve as advance sentinels to warn of attacking enemy aircraft on one-way suicide missions. They would also be used on reconnaissance, particularly for our amphibious forces. Emphasis is also being given to the development of troop-carrying,, cargo-carrying, and tanker submarines.

Recent war games have proved that the modern submarine is much more than a match for surface ships using the antisubmarine installations of World War II. That only served to emphasize that ships with *modern* equipment are not only capable of standing up to the new submarines but they actually have the edge on them. During the same exercises we "lost" only one out of eight ships with modern equipment, but they in turn "sank" five of the schnorkel subs despite the fact that all the odds of weather, area, and operational information were with the submarines.

The offensive potentialities of the Navy are inherent to the mobility of its forces. With the proper weapons and with the control of the sea, we choose our point of action. This prime advantage, the choice of where and when to strike, forces an enemy to spread his defenses thin. In trying to maintain his forces everyplace, he cannot be strong anyplace.

The fast carrier task force is the best-known example of this mobility. It can dominate the air and the sea in any area in which it operates and in the contiguous land area as well. Because of the dispersion of its ships, the task force—or any other fleet at sea—would not be a profitable target for the atom bomb. An atomic bomb might destroy one ship in an operating formation. The others would be saved by distance and could readily leave the contaminated area. In an atomic war, ships at sea would be the least likely and certainly the most extravagant targets. On the other hand, ships would—or could—be one of the most economical agents to deliver the atomic projectile, whether airborne or in guided missiles from floating launching platforms.

"It is essential to the relationship of mutual respect that we promote and maintain the independence of all nations"

In the event of another war it is certain that we shall need bases on enemy-held territory for our ground and air forces. In fully utilizing the potentialities of the triphibious Navy, we can buy the time needed to build up those bases after they have been seized.

Pattern of Attack

The pattern will not differ radically from that of the last war. All are familiar with the military and naval processes that carried us from Guadalcanal to Tokyo Bay, from Africa to Berlin via Sicily and Normandy.

The beaches must be cleared and the enemy pinned down by prelanding bombardments. The great convoys must be safely escorted to the area; local air superiority must be maintained; troops and equipment must be put ashore; the beachhead then must be continually supplied. We visualize that in a future conflict we shall be immediately confronted with the necessity for seizing advanced positions on a relatively small scale. Later we may become involved in much larger operations.

I have sought to avoid any technical references to particular fields of ordnance. Weapons have grown so complicated and so tremendous that any effort to discuss the subject in a limited time would be fatuous. But the influence of the development of ordnance on civilization brings me back again to the theme of American power as other nations may view it.

The disproportionate advantage in weapons has been an accomplishment of comparatively recent times dating, roughly, from the Civil War. Before then, as you know, belligerents had for centuries opposed each other with weapons that were more or less equal. The weapons were substantially the same. The technique in their use spelled the difference between victory and defeat. Basically, the advantage rested with the numbers of men that used the weapons and the intelligence that disposed the men to best tactical advantage.

The Atomic Bomb

When the single-shot rifle was replaced by the automatic rifle, fighting men were no longer equal for the first time since the gun was invented. The man with the automatic was equal to as many opponents as the number of bullets in his gun. The machine gun accentuated this difference and the disproportion was culminated in the atomic bomb. Now, the possessor of the bomb is the equal of thousands of men. All this has taken place in little more than a couple of generations.

The possessor of the atomic bomb can be the master of his less fortunate neighbor, but the principle of power in the realm of atomic energy parallels the principle of power at sea in a world of commerce. If the purpose of the United States is for the establishment of a better world for all humanity, then our power in any shape becomes a shield against aggressors opposed to universally accepted concepts of democracy.

Today our power is not confined to providing the comparative security we enjoy in this country. We are the defender of freedom and liberty for all peoples. Our accomplishments in war and peace in behalf of mankind are not simply a reward for us as a nation. By our actions we have transcended our own nationalism and have taken our place as the champion of freedom and democracy. It is an appropriate position for the most powerful nation on earth—for our power is a force for peace.

Outline for Preparedness

Intelligent Planning Must Obviate The Need for Production Miracles

by
Charles E. Wilson

"It is utterly impossible to mobilize suddenly for a modern war"

IT is a very signal honor for me to become the recipient of the medal which keeps alive the memory and tradition of General Crozier.

It would be presumptuous to recall to ordnancemen General Crozier's inventive contributions to the national defense. However, I cannot refrain from remarking that, in these days which demand so much of us in both specialized and general wisdom, it is especially helpful to remember the rounded heritage which we owe to a man of such varied talents.

Perhaps even more important than the application of engineering principles General Crozier's specific contributions of invention is the fact that he furthered to ordnance production. As Chief of Ordnance from 1901 to 1918, his contributions in this field established practices which are still helpful in solving today's problems.

He was a delegate to the International Peace Conference at the Hague in 1899 which, nearly fifty years ago, tried to chart the road to peace.

I am very grateful to the American Ordnance Association for this honor and for the invitation to address this historic gathering.

Prepare to defend yourself! In all military history there is no stranger command than this. No command is harder to obey or causes more perplexity. No command is more important to the continued existence of our Nation. The virtues of preparedness are well-known and are generally acknowledged on every hand. The evils of militarism and aggression are equally well-known and acknowledged. Thus, during most of our years as an independent nation, we have found ourselves continually on the horns of a dilemma.

To be prepared, one must act. To defend oneself, one must wait until a blow has been struck, because to do otherwise is morally wrong. To these familiar and mutually contradictory statements—which are so neatly combined in the command, "Prepare to defend yourself"—it is now plain that time and progress have added an engaging footnote, and it is this: When and if we next go to war, the first blow may well be the last.

It is probably true that the United States, as we know it and understand it, will never be prepared for war in the exact sense of the phrase, because war is the tragic result of a mental state far more than it will ever be the result of a physical state. We are constitutionally unable to achieve that mental state until after some one else has cast the die.

I don't think this is true of the American people because of any divine dispensation. Very few human beings, taken one at a time, are in favor of human destruction. But we have been more fortunate than many countries in one respect—that we have been much more the masters of our own fate. Here the individual is indeed a very powerful man; he has not been harnessed by fate, weakened by circumstances, and driven by ignorance to his own destruction as have so many of his fellow men in other corners of the earth.

Complex Preparedness

Preparedness today is not as finely drawn as it once was when a man either had a gun or he didn't have; when he had a stone or a club, or didn't have. It is now a matter of degree and great complexity. If it can be said that there is anything at all good about the critical and alarming situation in which we find ourselves today, with two great wars just behind us and angry portents ahead of us, it is this—there has been no time for apathy and forgetfulness to set in. Man for man and family for family we are surely more aware than we have ever been before of the danger in which the modern world walks and of the tremendous responsibility which we balance in our hands.

As I see it, our task is not just to beat the drum for preparedness. That idea already has been sold. The task is the infinitely greater and more difficult one of applying our talents and resources efficiently and with proper foresight. In a true sense, it is a technical task. Combat is no longer a matter of sticks and stones, or even of guns and ammunition, of tanks and planes and ships, and of that vast category of specific scientific weapons.

World War II taught us the grim

Mr. Wilson, president of General Electric Company and a member of the Advisory Board of the American Ordnance Association, delivered these remarks at the Industrial Preparedness Meeting of the Association at the Waldorf-Astoria, New York City, December 6, 1948.

lesson that combat is a matter of steel and coal and oil, of great transportation systems, of factories and laboratories, of millions of men and women who may wear no uniform. That old familiar game of counting the weapons has had to be discarded for the new game of comparing the weapons, and the weapons have been smokestacks, power plants, and mathematical formulas more often than not. Against such considerations as these, the business of preparedness has to be pursued with a new set of rules.

We heard much, not so long ago, about American production miracles and how they broke the back of the Axis. They *were* miracles, many of them compounded of genius and hard work. But nobody can be very happy over performing miracles while men are dying. Intelligent planning must obviate the necessity for miracles that aren't very dependable anyway in the final analysis.

You can't stockpile miracles. We need now to put into a proved and workable harness, into a continuing harness, not only the strategic and tactical task of the armed services but production machinery, research, and man power as well. You can't successfully lock up modern weapons in a storage closet because they become obsolete too quickly. We must have some kind of general-staff operation that is civilian as well as military in nature if we are going to develop, produce, and employ, as needed, such weapons as jet planes, automatic firing controls, guided missiles, atomic weapons and defenses, and meteorological controls.

War is no emergency job. Perhaps by eliminating the "emergency" factor we will do away with war forever, but in the meantime the burden of conflict does not rest alone on professional military men. The burden is on all of us—military, political, industrial, agricultural, scientific—to integrate our respective activities.

Cornerstone of Security

A continued, healthy, civilian economy is the cornerstone of any national-security program. It was just such a civilian economy—a capitalist American economy, incidentally paced by peacetime competitive enterprise—which constituted the operating base for our successful war effort. I know of no reason why we should apologize for our system, then or now. Those who so loudly and longly find it so evil today were glad enough to ride its back to victory in the great showdown. They have short memories.

My own memory may be faulty, but I can recall no socialist system that has ever been able to defend or sustain itself for long. Let us take a look at our own growing socialistic trends. My regard for beneficial government regulation, for wise social-security measures, and for constructive labor policies on the part of strong unions is as great as any man's. But some of the abuses that have been perpetrated in the name of labor, social security, and Sherman have eaten into our ability to defend ourselves in a modern world. The inexpert maladjustments of World War II—and there were many of them—were not enough in themselves to cripple the magnificient strength and flexibility of American industrial power. Next time, if added to calculated sabotage and criminal selfishness, they may tip the scales on the side of disaster. Let us be sensible and not throw away in disunity what we learned last time in successful teamwork.

"A continued, healthy, civilian economy is the cornerstone of any national security program."

You might consider our problem in terms of a road or highway leading to a wartime fighting front. The old concept of a wartime economy was characterized by turning plowshares into swords. Order was swept away in the sudden crisis, and everything went on an emergency basis. The road to war, over which our national forces had to travel, was an ugly, ungainly, and costly alley blasted through mountains of existing economic superstructure, and down that emergency-built thoroughfare were poured men and guns in a mad scramble.

The road to war today will not permit the existence of any such nightmare boulevard. With past years of scientific and industrial advancement it has widened and become a permanent, efficient thoroughfare—permanent in the sense that the basic requirements of war and those of peacetime are largely the same—raw materials, manufacturing capacity, transportation, research, and communications. It is a road that we must keep open and in good repair, even if we never use it. It must be there when we need it.

Preparedness Program

Five years ago, in a talk before members of this Association, I said: "It seems intelligent and essential that there be continued in time of peace the proved framework of an organization, comparable to the War Production Board, which will be constantly available for a time of emergency and which will draw on the store of experience, good will, production technique, research technique, and planned coöperation between the armed forces on one hand and private industry on the other. This liaison should never be allowed to die." At that time I submitted, as a sort of motion from the floor, six suggestions which I would like to repeat now, with your permission:

1. Any all-inclusive program of continuing preparedness must be initiated and administered by the Federal government, specifically by the executive branch.

2. It must be a continuing program—not an emergency one.

3. It must be insured and supported by the Congress through advice, legislation, and appropriation.

4. Industry must respond and coöperate—it must be *allowed* to do this, not hampered and frustrated.

5. In respect to the research and development phase, we should utilize existing facilities, and both service and civilian groups should be represented through advisory committees in which civilian representation sharpens the natural conservatism of the Army and Navy. Contact must be maintained among industrial laboratories, schools, and Government establishments.

6. In respect to the production phase, it is most important for industry to maintain permanent liaison men on all phases of national security. There should be no domination by any particular group in this picture because it is too big; but there must be maximum contact and exchange.

These suggestions, repeated here in very brief form, stressed the importance of the production, procurement, and research phases of security, both from the purely military standpoint and also from that of the impact of the military program upon the civilian economy. This is because the dynamic growth of modern warfare means that a compara-

ble growth, efficiency, and flexibility in the peacetime security structure is also needed.

To repeat, it is utterly impossible to mobilize suddenly for a modern war. Also, we must set up a security machinery so devised that it will constantly attract the attention of specialists in private business and will compel their thinking to come out freely, without suppression, or discouragement.

Since the time when those suggestions were presented to an ordnance group, we have had Unification—at least in name—and the National Security Act. They are both worth examination, and they need continuing constructive criticism and attention from such a body as this if they are to succeed in their purpose.

In the final report of the Senate Committee Investigating the National Defense Program, established March 1, 1941, under the chairmanship of Senator Harry S. Truman and concluded seven years later under the chairmanship of Senator Owen Brewster, are found the over-all dimensions of our wartime mobilization, production, and conversion. In case you have forgotten, let me mention some outstanding examples.

"The Crozier Gold Medal, founded in honor of Maj. Gen. William Crozier, Chief of Ordnance, United States Army, 1901-1918, is awarded by the American Ordnance Association to Charles Edward Wilson, Executive Vice-Chairman of the War Production Board, World War II.

"For distinguished service in the advancement of American ordnance in the armed services of the United States—ground, sea, and air. Engineer, industrial statesman, administrator, and humanitarian, Mr. Wilson is acclaimed by the American Ordnance Association for his steadfastness, wisdom, energy, and leadership in marshaling the industrial strength of the United States for the attainment of victory and the preservation of security and peace."—*Citation accompanying award of the American Ordnance Association's Crozier Gold Medal to Charles E. Wilson, New York City, December 6, 1948.*

Dimensions of Mobilization

From an armed force of 310,000 in July 1940, we mobilized to a strength of over 12,000,000 in May and June 1945. Our civilian employed man power increased from a peacetime force of 48,850,000 in July 1940 to a wartime high of 56,290,000 in 1943, and to an all-time high of 60,079,000 in July 1947. American industry and labor achieved such wartime miracles as the production of 296,400 planes, 15,300,000 rifles, carbines, and sidearms, 4,200,000 tons of artillery shells, 41,600,000,000 rounds of small-arms ammunition, 64,500 landing vessels, 6,500 other Navy ships, and 5,400 other cargo ships and transports.

In all, this nation produced $186,000,000,000 worth of munitions for ourselves and our allies during the war period. For the fiscal years 1941 through 1945 the Government spent $317,434,208,000.

Here is an excerpt from the Committee's report which I think is pertinent:

"A prompt and effective mobilization of our entire economy is essential in the event of war. In time of war our armed services are dependent upon the economic resources of the Nation and the productive capacity of its people for the vast amounts of weapons and supplies necessary to equip and maintain a modern fighting force. At the same time, our economy must meet the essential needs of the population.

"In reviewing the history of our mobilization-planning efforts in two world wars, the committee has observed that the lessons learned from experience in controlling our national economy during World War I were largely disregarded when similar problems confronted us in World War II. Only belatedly in World War II did we put into effect many of the organizational principles embodied in our industrial-mobilization plans.

"The committee recommends that the Congress give close and continuing attention to the activities of the executive departments responsible for mobilization planning in order to make certain that the industrial-mobilization plan now being considered is formulated promptly. Once the plan is completed it should be periodically revised from time to time in the light of changing strategic military plans and technological developments."

The first thing I draw from this, of which I had been painfully aware, was that our recent planning was not bad—it was just late. The second thing is that many of us feel that the Congress should have more closely associated itself, through committee representation, with the permanent statutory setup which resulted in the National Security Act. In such a way it could have participated more closely in the forthcoming planning, been more familiar with it and responsible for it, instead of creating security planning machinery which would become so completely a part of the executive branch, as it is in the present case.

Here is another pertinent quotation from the committee's report. It complains, in the section on labor, that too many Government agencies were mixed into labor problems, some competing with others, and none having the clear authority to announce a settlement and enforce general acceptance. It wants these agencies and policies coördinated and stabilized under a single competent and experienced responsible head in order that labor policies may be uniform throughout the country, and, further, it complains that the AFL and CIO could not control their locals to this end.

The Senate committee report also noted that absenteeism had been responsible for cuts in production of as much as ten per cent during the last war and recommended revocation of draft deferments in such circumstances. It felt that Selective Service and the U.S. Employment Service should be coördinated to carry out an effective man-power policy, both of them to be under a single man-power agency, nationally, regionally, and locally. It stressed voluntary coöperation, but noted that "wherever possible local committees, subject to appropriate appeals, should be given a determining voice in how to apply locally the basic national man-power policy." Again, it stresses that military and production plans should be balanced against overall man-power resources, and a single head made responsible.

Man Power Recommendations

Here are some further recommendations on man power from this committee: Intelligent use of draft deferment to meet critical man-power shortages in key areas; attention to employers' hiring policies rather than coercing the individual employee; that the General Staff check its strategy against total man-power resources to make sure an efficient balance is achieved; attention to the most efficient utilization of labor, with failure to do so considered later in determining profits after renegotiation;

concentrating essential civilian production in areas unsuited for war contracts and enforcing this through priority controls; use or convert existing facilities wherever possible when expanding war production instead of building new plants, thereby avoiding shifting workers and creating new problems in housing, utilities, and schools; suspension of union work rules, contract provisions, or statutory provisions which act as a curb on production during an emergency; that at such times recruiting by the armed services be stopped and volunteering allowed only with the approval of the man-power agency in order to avoid disrupting production; lengthening of the work week and control of women in industry, with the payment of overtime in bonds good only for meeting tax payments. There are many other such recommendations which will help to shape our plans.

Statement of Importance

In reporting on the Office of War Mobilization and Reconversion, an agency which we now find emerging under another name in present legislation, the Committee's statement was of special importance. It was that such an agency must be put on a supervisory and operating basis with direct control over other war agencies. It must plan and issue orders, not confine itself to umpiring disputes. Emphasis was given to its postwar functions, such as reconversion and removing controls.

Again and again this report states that there is a primary need for clearly defined authority in the administration of our domestic war program. This authority should be centralized in the hands of a few officials, each solely responsible for the administration of certain activities; the group should meet frequently to eliminate all conflicts in jurisdiction, and be ready to advise the President on important questions of policy while relieving him completely of all administrative work.

Of the War Production Board—and presumably of its successor under a new plan—it says that strong over-all authority must be made a living reality, ready to make decisions and enforce them over the objections of aggressive department heads. It must function as a board, without dilution of the power of the chairman.

This is enough legislative history for our purposes, but here are certain things which seem to emerge in summary: First, this is Congress speaking, in a real sense, and under our system of government that means the people, not just a few executive planners. This document is one of the most important and useful to come out of the wartime experience.

Secondly, running through all these comments you will note the feeling of national unification, of balancing and coördinating the individual rôles of the military, industry, and labor, most noticeable in the comments on man power, in which the soldier and civilian are considered properly as part of the same army and subject to the same marching orders.

The keystone of all this planning, of course, is the National Security Act of 1947, approved a year and half ago by the Eightieth Congress which stated its policy was "to provide a comprehensive program for the future security of the United States." I am sure that most of you are familiar with the National Security Act, which provides broadly for the establishment of three main extensions of the executive power—the National Security Council, the National Security Resources Board, and the National Military Establishment.

The first of these is a sort of enlarged wartime Cabinet which will also exist in peacetime. The Resources Board, under a civilian head, is supposed to advise the President concerning the coördination of military, industrial, and civilian mobilization. The Military Establishment, under the Secretary of Defense, consists of the Army, Navy, and Air Force Departments, plus four other agencies—the War Council, the Joint Chiefs of Staff, the Munitions Board, and the Research and Development Board.

The Resources Board, similar to the recent Office of War Mobilization and Reconversion but with a permanent status and considerably more scope and authority, will concern itself with relationships between supply and requirement in the case of man power, resources, and production facilities in time of war. At the risk of repeating something that you may already know, it is worth noting that the Board will study reserves of strategic and critical materials and the relocation of industries, services, Government activities, and economic activities.

To me there seems to be a certain amount of overlapping between the Resources Board and the Munitions Board. The fundamental distinction seems to be that the latter is part of the structure of the Military Establishment, and subordinate to it, while the Resources Board is not only constituted independently of the military but is also concerned more broadly with our entire economy. Those who have had experience with governmental organization and who subscribe more or less to the need for a continuing preparedness program, will at once perceive that success or failure of such a program under the structure of the Security Act lies squarely with the Resources Board.

We are wisely providing that top direction will be in the hands of civilians, which is in the best American tradition. In my own view, it must be kept there, and it is also my hope that as this complex structure shapes up, with its provisions for multiple agencies under the supervision of the Resources Board, the chain of responsibility up through the Board and its chairman to the President will be maintained and not weakened by short cuts and emergency diversions.

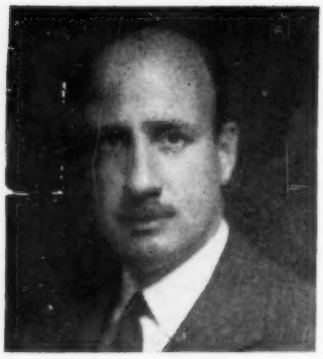
Industry's Part

What are some of the ways in which civilian industry must do its part? First, by working over requirements for stand-by plant and machine-tool programs. Secondly, by willingly and intelligently serving on the many civilian boards and advisory groups which will be necessary. Thirdly, by continually surveying its own resources, man power, products, and adaptabilities with conversion in mind. Fourthly, by maintaining permanent liaison with the appropriate Government agency. Fifthly, by providing much-needed criticism of the mobilization program as it develops. Sixthly, and most importantly, by helping through participation and understanding to maintain the needed sense of balance that will keep us from slipping into an artificial wartime economy.

This is not an exclusive list by any means. It merely points the direction in which industry—and labor and agriculture, too—must move. Participation and understanding are our greatest safeguards.

With the aid of a little faith, and a little of God's help, they may keep us from having to go to war at all. This in my humble opinion is the true "Road to Peace."

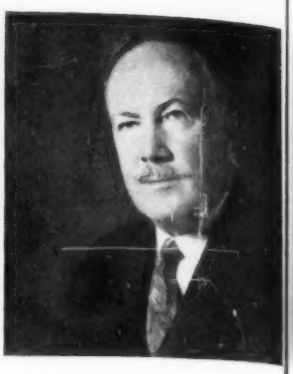
Officers and Directors of the A.O.A.



C. Jared Ingersoll

K. T. Keller

C. D. Wiman



James L. Walsh

The American Ordnance Association will have the same leadership during the next two years that has carried it so successfully through the transition period when its sights were raised, its field broadened, and "Ordnance—ashore, afloat, and aloft," became its stated goal. The Council of the Association—the elective body of the organization—at its meeting in New York, December 6, 1948, reëlected the three directors whose terms of office expired December 31, 1948. They are: C. Jared Ingersoll, Philadelphia, Pa.; K. T. Keller, Detroit, Mich.; and Charles D. Wiman, Moline, Ill. These directors will serve for four years, their terms ending December 31, 1952.

Mr. Ingersoll served with distinction as chief of the Philadelphia Ordnance District during the greater part of World War II. He is a member of the Association's Executive Committee and is a leader in railroad transportation fields.

Mr. Keller is well known for his sterling leadership in the automotive industry, his great contributions toward ordnance production goals during World War II, and his unfailing assistance to all segments of our National Defense Establishment.

Colonel Wiman also is a leader of industry who has attained preëminence in the production of farm implements. He served in the Ordnance Department of the Army throughout World War II by helping solve many of the manpower difficulties of those days.

At the meeting of the Board of Directors on the same day, the following officers of the Association were elected for terms of two years each ending December 31, 1950:

Col. James L. Walsh, president of the Association, is one of its founders. He founded and was first editor of the Association's journal, ARMY ORDNANCE. He also founded and edited the publication LOGISTICS during World War II.

Col. H. A. Gidney, vice-president of the Association, has served the organization faithfully and well since World War I. Formerly president of the Pittsburgh Post of the Association, he is a leader of Pittsburgh industry and is identified with many civic and philanthropic activities of that great city.

Harvey C. Knowles, vice-president of the A.O.A., is a production engineer of long experience and a leading figure of American industry. He brought to Ordnance production problems in World War II skills which were largely responsible for the success of the great explosives loading programs.

At the same meeting of the Board of Directors the following officers were appointed:

Brig. Gen. John Ross Delafield, distinguished for his service to Ordnance in World War I and eminent as an attorney in his native New York, will continue as counsel of the Association.

Col. Henry Parsons Erwin will continue as treasurer of the Association. A member of the governing bodies of several of the larger financial organizations of the Nation's Capital he was among the first group who, with Colonel Walsh, inaugurated the Association in 1919.

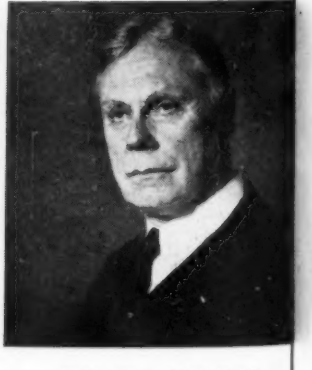
Miss Florence G. Ferriter will continue as secretary of the Association. Her loyal and efficient direction of the activities of national headquarters are reflected in the precision with which these operations are conducted.

Leo A. Codd will continue as executive vice-president of the Association. A member of the Association's staff since 1923, he has served successively as assistant secretary, secretary, and executive vice-president and also as associate editor, managing editor, and editor of the Association's publications.

Herbert A. Gidney

Harvey C. Knowles

Henry P. Erwin



John Ross Delafield

Industrial Preparedness Meeting

A.O.A. Commemorates Pearl Harbor Day in New York

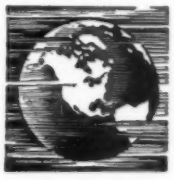
"WE are men of peace. We do not want war. We are seeking with all our energy, all our brains, everything we can contribute, to avert war altogether." With these stirring words Col. James L. Walsh, president of the American Ordnance Association, rallied more than 1,200 members and their guests who assembled in the Grand Ball Room of the Waldorf-Astoria in New York on the eve of Pearl Harbor Day, December 6, 1948. It was a moving appeal which sounded the keynote of the historic proceedings which followed. They were:

1. An inspiring prayer by His Eminence Francis Cardinal Spellman, Archbishop of New York. The Cardinal invoked a divine blessing upon our heritage of individual freedom. "We are free men by the will of God," His Eminence prayed, "and free men we shall always be or die mingling our blood with the blood of our sons. We dare not be traitors to their sacred trust—our Nation's heritage and the world's hope." The complete prayer is published on the frontispiece of this issue.

2. The award of the Maj. Gen. William Crozier Gold Medal for Distinguished Ordnance Service to Charles E. Wilson, Executive Vice-Chairman of the War Production Board during World War II and renowned head of the General Electric Company. The citation accompanying the award reads: "For distinguished service in the advancement of American ordnance in the armed services of the United States—ground, sea, and air. Engineer, industrial statesman, administrator, and humanitarian, Mr. Wilson is acclaimed by the American Ordnance Association for his steadfastness, wisdom, energy, and leadership in marshaling the industrial strength of the United States for the attainment of victory and the preservation of security and peace."

Following the reading of the citation, Colonel Walsh asked Bernard M. Baruch, one of the honor guests, to present the medal to Mr. Wilson—a particularly appropriate act whereby the Chairman of the War Industries Board of World War I, himself an American Ordnance Medalist, joined in honoring one who directed much of the industrial-mobilization burden in World War II. Mr. Wilson's noteworthy address in response is also published in full on page 320 of this issue.

3. Three stellar addresses by leaders of the armed forces: Lieut. Gen. Robert L. Eichelberger, former commander of the Eighth United States Army in the war in the Pacific and deputy to Gen. of the Army Douglas MacArthur; Adm. Louis E. Denfeld, Chief of Naval Operations, United States Navy; and



Maj. Gen. James M. Gavin, famed World War II commander of the 82nd Airborne Division. The three addresses were received with great acclaim for their significance.

4. The presentation to Leo A. Codd, executive vice-president of the Association of a beautifully bound volume of letters from more than threescore officials of the Association throughout the Nation commemorating his twenty-five years of service to the Association. Chairman Walsh originated the idea and was materially assisted by Arnold Hanger, member of Council from New York, who came especially from Florida to participate in the presentation. In accepting the volume, Colonel Codd said:

"Those of you who know me will realize that this is a case of mistaken identity. You will find it as difficult as I do to associate the glowing and generous remarks of our toastmaster with the subject.

"I can simply say that the height of my surprise is second only to the depth of my thanks. I am most grateful to all of you for this very generous and ill-deserved tribute. As I read the letters in this very precious volume, I shall do so always with a sense that whatever of praise they may contain belongs far more to others than it does to me.

"It belongs in an especial way to that loyal group at National Headquarters who contend with my foibles from day to day. It belongs to the members of the armed services with whom I work so intimately and so frequently. It belongs, in great measure, to the officers and directors of the American Ordnance Association, who are always so patient and understanding with me.

"And, finally, whatever there may be of praise in these letters belongs in a very real way to you members of the American Ordnance Association who through the years have helped in our work for peace. Your loyalty and zeal and ever-willing attitude to help bring the tranquility of order to our country will always be, for me, an inspiration."

5. Arrangements for the meeting were under the capable direction of Maj. C. Stewart Comeaux, president of the New York Post of the Association, who presided at the dinner meeting. The function was sponsored by the New York Post, and its success was due in great measure to the efforts of the New York Committee under Major Comeaux's chairmanship. Serving on the committee were also the presidents of the other Posts of the Association.

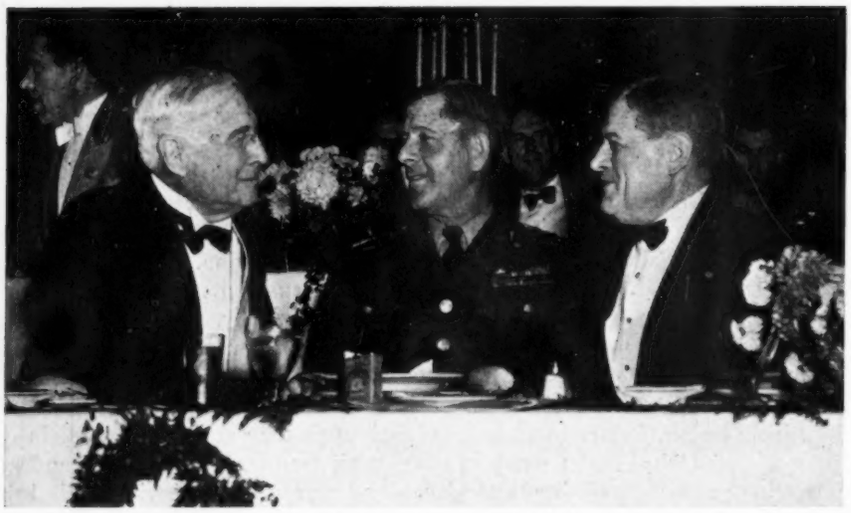
6. Highlight of the day's proceedings was a visit by members and guests of the Association to the aircraft carrier U.S.S. KEARSARGE. By invitation of the Secretary of the Navy, and with the coöperation of Vice Adm. John D. Price, Deputy Chief of Naval Operations (Air), United States Navy, some 700 men and women gathered at the Waldorf-Astoria at 10 a.m. for the journey by bus to Bayonne Naval Base where the mighty carrier was docked.

There, Capt. C. S. Smiley, commanding the KEARSARGE, and his staff greeted their guests and extended all hospitality. The visitors were taken through the huge ship and shown its myriad complicated operations and equipment. From flight deck to hangar deck to galley the vistors were afforded full opportunity to inspect the workings of this mighty fortress and to gain a better realization of the true meaning of naval air power. Luncheon of excellent cuisine was served aboard.

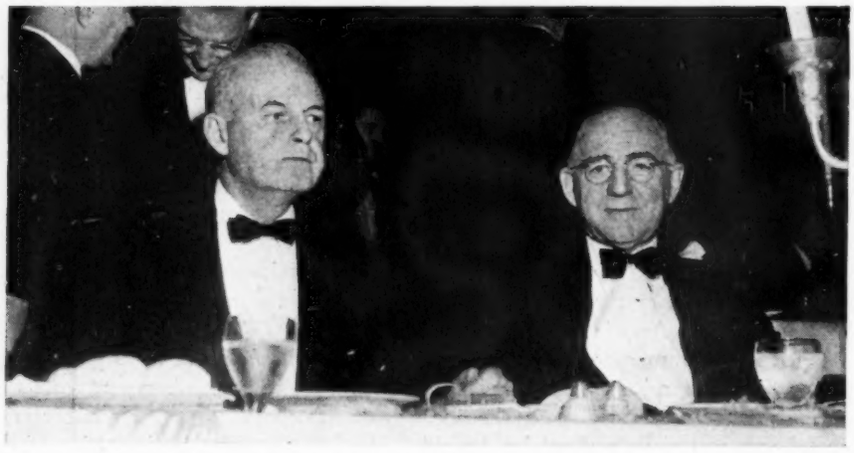
It was a most instructive occasion for which the officers and members of the American Ordnance Association are deeply grateful to the Navy—and equally commendatory.

THE ROAD

The A.O.A. Industrial Preparedness Dinner Meeting was held at the Waldorf-Astoria Hotel, New York City, on December 6, 1948, the eve of Pearl Harbor Day. Twelve hundred industrialists from every section of our country met under the auspices of the New York Post to reaffirm



Three distinguished guests at the meeting, Bernard M. Baruch (left), General Jacob L. Devers (center), and K. T. Keller (right) chat together during dinner.



The two vice-presidents of the Association, Harvey C. Knowles of Cincinnati (left) and Herbert A. Gidney of Pittsburgh (right) were honored guests at the meeting.

The Dinner Meeting, held in the Grand Ballroom of the Waldorf-Astoria, was a demonstration of

Prominent guests whose presence set the high tone of the meeting were, left to right: C. E. Wilson, K. T. Keller, James L. Walsh, Gen. Jacob L. Devers, Francis Cardinal Spellman, Adm. Louis E. Denfeld, Gen. R. L. Eichelberger, and Maj. Gen. James M. Gavin.

Col. L. A. Codd (right), executive vice president, A.O.A., receives from Col. J. L. Walsh, A.O.A. president, a volume

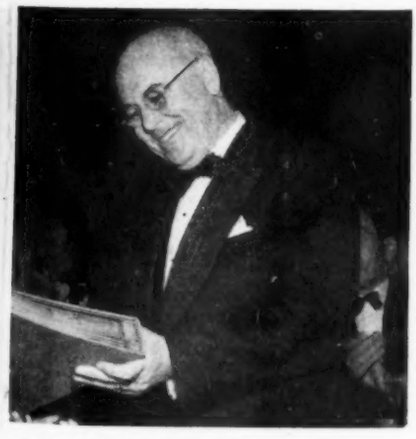
TO PEACE

their belief that the strength of America lies in the mills and factories, in the mines and oil wells which can give her military stature and potential power, the most decisive argument for maintaining the peace of the world and protecting the freedom of mankind.

C. E. Wilson (left), Executive Vice-Chairman, War Production Board, World War II, received the A.O.A.'s Crozier Gold Medal and a citation for outstanding ordnance service.

the eagerness of the Nation's leading industrialists to contribute to the military strength of America.

One of the high points of the meeting was the inspection of the aircraft carrier U.S.S. KEARSARGE by more than 700 members who were guests of the Navy at lunch.



of testimonial letters from military and industrial leaders in recognition of his 25 years of loyal and outstanding service.

Left to right: Capt. C. S. Smiley, commanding the KEARSARGE; James L. Walsh, president of the A.O.A.; Rear Adm. M. F. Schoeffel, Navy Bureau of Ordnance; and L. A. Codd, executive vice-president, A.O.A., during the visit to the carrier in New York Harbor.

Military Executive Competence

The Armed Forces Must Have Men Trained in Big Business

by

Robert Wood Johnson

The success of any plan of operation stems from good management

IN planning for M-day, the master minds of our armed services worked out the number of shoes required for an army of one, two, and up to ten million men. In great detail, the military planners estimated the matériel requirements for a defensive war, an offensive war, and a war of many fronts, with depots spread along the line of supply.

This was done for food, clothing, rifles, and even for such modern weapons as tanks and antiaircraft guns. The War College established a skeleton force that would implement these plans in the event of war. Industries were selected to provide vital goods, and some of them were given educational orders. The plans were comprehensive. In many sectors they also were thorough and up to date.

We need not dwell on the fact that the Government pushed those plans aside when we got into World War II —that's water over the dam. What concerns us today is this: In spite of all attempts at foresight, the military forgot the most important element of all—an executive organization to put into effect and then carry out these or any other plans of operation. In fact, the big brass did not even consider the need for such an organization or the problem of staffing it with first-rate executives.

Robert Wood Johnson (Brig. Gen., A.U.S., Ret.) is chairman of Johnson & Johnson, New Brunswick, N. J. During the past war he served in such capacities as chief of the New York Ordnance District; Vice-Chairman, War Production Board; and Chairman, Smaller War Plants Corporation.

This omission often staggered businessmen who entered military service. During the early part of the past war, for example, our ammunition program sank into confusion that was close to chaos. The Chief asked me if I would help plan production, and I promised to try. A staff meeting was held and after several hours of explanation and preliminary discussion we got down to what should have been work. At this point I suggested that we call in the planning engineers. My officer colleagues gasped out, "What are they?"

Business had created the planning engineer some thirty years ago. Between the first and second World Wars executive planning had become a recognized profession; yet it seemed that most military bigwigs had never heard of it. When I outlined the functions of a planning engineer, however, my colleagues were sufficiently impressed to recommend that several of these men be employed.

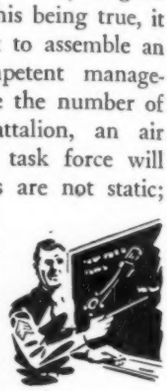
Believing in the policy of advancing men from within the service, I went to the Department of Military Personnel and asked its chief whether he had any expert planning engineers in his roster. He looked blank and replied that he didn't think so; he'd never heard of that designation. But, of course, I was free to look through the files.

No Planning Engineers

These files held the names of thousands of officers from the rank of captain to colonel, and we went through them all. The cards told us when each man had graduated and from where, how long he had been in the service, and what his military assignments had been. From a functional viewpoint, however, the records told nothing—and they also contained no trace of a planning engineer. We had to go to industry to find even one man.

Time went on—precious time—time to spare which we will never have in the future. Much of it was wasted in a frantic search for executives who had to come ready-made from commerce and industry. By its very repetition, this pattern proved that both the principles and practices of modern business had not made their way into military thinking. We shall see that they also have not made their way into government as a whole.

Long ago business realized that an operation of any kind is only as good as its management. This being true, it is far more important to assemble an enlightened and competent management than to compute the number of "widgets" that a battalion, an air squadron, or a naval task force will consume. Such figures are not static; changing times and combat techniques will expand or curtail them.



But nothing will affect the over-all need for first-class management. To stretch a point, it can be said that top-flight management will meet any set of figures, however rapidly they change. But no matter how good the figures, no one can get results without good management.

During the war, Regular officers learned a great deal by association with businessmen who entered military service. Business methods, however, are not static. During the years of peace—even troubled peace—business will progress because its leaders demand advances and because its costs must be cut to meet competition.

Under our present system, however, the military are very likely to stagnate. Unless that condition is prevented, we may face another world war with the same lack of executive preparedness that faced us in December 1941.

Let's be fair to the services—they are trying to prevent this. Plans are under way to send officers into industry on a fellowship basis which may turn a few young men into real executives. The War College also trains selected officers in problems and methods of supply. The difficulty is that the "fellowships" do not prepare many men, while the War College courses are taught by instructors who themselves are Army officers. What is to keep them on the alert for civilian progress?

This problem isn't a simple one. Annapolis and West Point are old-line schools, thickly encrusted with tradition and shot through and through with the conviction that all things military are better than anything civilian.

Likewise, neither can the student from a civilian university possess ability in this field at graduation.

Education Plus Experience

Able planning engineers, as well as other specialized business executives, develop through education plus years of experience. The executive who is to succeed in the business side of the military world needs this training, as well as an intimate knowledge of military requirements. Once in service, his routine also must frequently be refreshed by courses conducted by the most capable and well-informed executives in the country.

The United States can never again spend the time and the money to blunder through to military adoption of methods already proved in civilian life. If jet planes, rockets, and atom bombs have any significance at all, they mean that we shall not have time to blunder. We already have reached a state in which we have neither the materials nor the money to waste through blundering.

Our generation of Americans has been brought up on the fallacy that the resources of the United States are endless and can never be consumed. Theoretically, therefore, we could win any war by supplying allied nations with everything from flour to warships, allowing vast supplies to substitute for inefficient use.

Today, however, we must face the fact that American resources *are* dwindling. Soil is going or gone, and forests are depleted; high-grade iron ore has grown scarce; copper ore no longer meets our needs; and intensive search for critical rare metals has failed to reveal adequate deposits.

Our Nation has grown great upon resources accumulated through geologic eras; it has paid for extravagant mistakes by recklessly mortgaging the future. At the same time, costs of military operations have ballooned. Authorities tell us that in the year 1895 an American family of five paid a *prorata* bill for all military expenditures which amounted to exactly $5.95. "By 1916, this had risen to $13.06 per family. In the boom year of 1929, the cost per family was $28.45. Today, the *average* American family spends at the rate of $502 annually just for armament alone." (Baxter Report June 21, 1948.)

It is axiomatic in business that when costs soar and raw materials run low, executives of high caliber are given a chance to size up and then solve the problem. Now, unless the laments of both reformers and politicians are pure hokum, this and a dozen other major difficulties confront our Nation and have confronted it for at least three decades. As the biggest collection of businesses in the world, it seems reasonable that our Government should assemble a massive array of executive talent and give it unparalleled freedom to work, spurred by stern insistence that it produce results.

It appears reasonable that this should be true—but actually it isn't. In time of war the Government does bring in executive talent. But this talent does not have freedom to work, and instead of insistence upon results it encounters endless insistence upon what must *not* be done.

Here again we consider the military, which is Big Business in capital letters when a war begins. The services call in some businessmen; they analyze requirements and quickly call for more. These men come in a burst of patriotic enthusiasm only to find themselves surrounded by barriers, with new ones popping up every day.

Barrier of Rank

The first barrier is that of rank—rank plus military tradition. There was a time when a substantial number of our outstanding civilians were former West Point or Annapolis graduates. Thus a Grant or Sherman could come back into service and rapidly become a general officer. Today that is much more difficult, and men of top executive achievement find themselves compelled to defer to Regular officers who outrank them but who do not know the score.

Next come the two most devilishly intricate and troublesome volumes the mind of man has perfected—the military rule book and the Civil Service Regulations. Both were written in good faith; both grew out of troublesome and often rare incidents which all hands forthwith decided must never occur again. Year after year, therefore, the rules were expanded until both volumes now bulge with stuffy, meticulous limitations that lead only to dissatisfaction, fantastic waste, and disastrous delays. But unlike the nonsense that sometimes gets into corporation by-laws and union rules, these limitations have the force of law and cannot be ignored.

Now and again an individual departmental chief does throw away the rule book, but within a few days the General Accounting Office, the Adjutant General, or the Head of Something-or-Other will descend upon him to demand that he immediately return to the thorny path of delay, frustration, and expense—or else. The law says that these governmental policemen are right. It also charges them with the duty of forcing operating divisions to follow the printed rules.

Sometimes, of course, even governmental watchdogs perceive that regulations must be ignored or interpreted with caution. This relief, however, is temporary—and it may be dangerously deceptive. More than once men who broke some trivial rule to sink an enemy squadron or bring victory in a landing operation have been found out and then hauled before a reviewing committee.

In the days when we had to break rules or risk defeat, one of the commonest farewells in the Pentagon was, "I'll see you in Atlanta Penitentiary." There were times—many times—when this remark was made without a smile!

Conditions in civilian departments are no better than those in the military. There Civil Service reigns supreme on the lower levels, while politics rule the higher. Top men know they are temporary; those below them are busy sitting tight, at the same time using rules to make themselves seem more important than they really are. This spells frustration and stagnation made worse by the fact that Government salaries are too low to attract and hold able executives.

The result, again, is a startling absence of methods, skills, and specialties whose value has been proved in nongovernmental life. Business, for example, has been forced to develop a new concept of the men and women who make up its working force. To apply this concept it has developed the profession of personnel management, also termed human engineering or industrial relations.

Although relatively new, this profession has a background of fifteen to twenty years of service and an imposing record of accomplishment. However, the very existence of personnel

managers has not been acknowledged by most civilian, not to mention military, branches of governmental management.

The result? Take a good look at our Civil Service employees. Some are happy, industrious, and able; I suspect they would be so anywhere short of a concentration camp. Vast numbers, however, are unhappy in their work, dissatisfied with their pay, resentful of higher-ups, and at odds with their fellow workers. Others are apathetic. They bucked the system in their youth and lost. They now cling to their jobs, but otherwise have thrown in the sponge.

The question of bringing in new blood is closely linked with executive competence. On the whole, men and women choose to work with companies that are well-managed, sound, and fair. In normal times they avoid employers who are otherwise. Can we afford to keep our Nation in the ranks of undesirable employers when to do so means that we both take the leavings and beat down the spirit of those workers who feel unable to go elsewhere?

Americans must wake up to the menace of this situation. Government is not merely big business; it is a collection of big businesses such as the world has never seen before. Obviously it demands the world's greatest collection of executive ability, used to the very limit of its possibilities. But executive competence is not common, while executive talent or genius is among the rarest of human qualities. To secure them, Government must match or exceed the inducements offered by private corporations.

Better Salaries

But, critics may say, Government can't afford to pay business salaries. Nonsense! A business that takes in 150 million dollars per year pays its president $150,000 and profits by doing so. Our departments of national defense, which spend many billions, pay their four top men $15,000 each, and lesser executives in proportion. They also lose in money, morale, and efficiency of service. Where does that leave the argument that we can't afford to pay decent salaries?

Other critics maintain that Government cannot be given the flexibility of modern business. First, they say, rules and laws are necessary in anything as complex as a compound of legislative, executive, and judicial organizations. Secondly, close regulation is needed to prevent reckless mismanagement and willful dishonesty.

With the first point we must partly agree; *some* laws and rules are necessary. But is there any reason why laws should not be kept on broad, general levels, leaving rules to do many jobs that now are written into statutes? And

Our Government is the sum of many big business operations, all of which demand top-flight executive ability.

is there any reason why rules should not be reviewed, revised, and kept to a minimum? After all, no business executive demands the complete freedom of anarchy. All he asks is laws that are effective and rules that meet today's needs instead of being obstructive survivals from other and often unusual days.

As for reckless mismanagement and dishonesty: During my years in business and in Washington I have worked with thousands of civilian officials, as well as military men. By and large, I have found them to be cautious—often too cautious—and scrupulously honest. This is specially true in the higher ranks and among men who were already accustomed to power and responsibility. There are chislers and crooks, of course, but they are rare. They also do their damage unhampered by the rules that harass and often discourage abler and honest men.

I believe, therefore, that nothing really demands the limitations that now deprive governmental business of executive competence. On the contrary, I believe that competence can be hired and also developed if we as a Nation can persuade ourselves to take these essential steps:

1. Review both laws and rule books, throwing out all dead wood and revising what is kept to make sure that it really serves a purpose.

2. Raise governmental salaries to attract and keep top-flight executives in Government service.

3. Insist that lawmakers, and especially lawmakers bent on investigation, respect the rights of executives and let them do their work. No man worth his salt will stay where demagogues browbeat him or compel him to hire constituents regardless of their worth.

4. Watch for and insist on results. This will keep the timeservers from getting too much in the way of able men. It also will curb the feuds that periodically rage within and between departments.

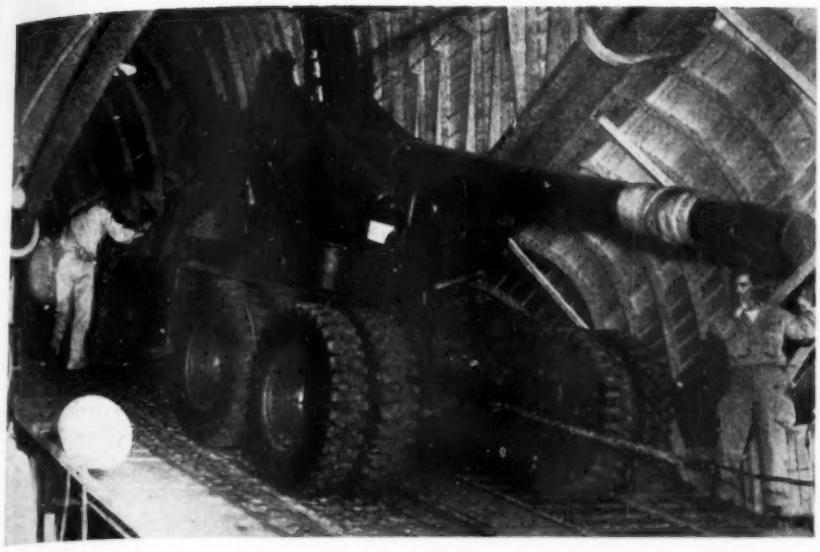
These four steps rest upon an assumption—the assumption that civilians, not military men, will continue to control our economy. Modern war, with its tremendous demands for raw materials as well as manufactured products, already has given Big Brass dangerous power over civilian affairs. During the last war, indeed, civilian government virtually abdicated and gave the military free hand. This was a serious threat to our American way of life. We must take care that it does not happen again lest the military become our rulers during peace as well as war.

Five-Man Board

Why did civilian government abdicate? One reason, I suspect, is the fact that its executive—the President—is a fantastically overworked man who simply cannot expand his duties to include management of a modern, global war. Instead of letting the military take over, suppose we establish a 5-man board of our most able civilians and let them do the job in accordance with sound business methods and sound democratic principles.

Such a board, should it be established, may well include one man from the Senate, one from the House, one man from industry, one man from labor, and one to represent the general public and probably to act as chairman. These men must be chosen for their executive ability as well as knowledge and will be directly responsible to the President. In fact, they will become part of a composite President. Equally important, such a board will be a guarantee that we shall not win military victory merely to find ourselves permanently saddled with the regimentation of a military government.

Admittedly all governments are less than competent—but there are degrees of incompetence. As our very lives depend upon our defense, we must insist that in defense we have the minimum of incompetence.



Airborne Ordnance

U.S. Weapon Designers Are Striving To Make Our Guns Air-Transportable

by

Maj. Gen. H. B. Sayler

Every artillery piece will eventually be able to be employed in airborne operations without disassembly

LIEUT. GEN. Nathan Bedford Forrest ungrammatically but accurately stated that the way to win a battle was to "get there fustest with the mostest." Forrest's maxim is as true today as it was during the War Between the States. However, while this principle is enduringly valid, methods of achieving the necessary swift concentration of men and matériel are always in a constant process of evolution.

In World War II, the mechanization of armies in the field greatly increased their mobility over that of the horse-drawn and imperfectly motorized forces of World War I. Nevertheless, railroads, motor transports, and steamships remained the customary means of transportation over long distances.

The mass transportation of soldiers, weapons, and supplies by aircraft is still in its early stages of development with eventual possibilities dependent not only on the abilities of the airplane designers and the aircraft industry but also upon the skill of ordnance engineers in devising matériel that can be readily loaded into aircraft, that will be as light as possible consistent with strength, and that will retain the characteristics essential for efficient use in battle.

While it is true that larger and larger planes are being built, the prime requisite for airborne items remains that of minimum weight. Thanks to recent advances in metallurgy, both lightness and strength can be incorporated in matériel by the use of aluminum and magnesium alloys. The Ordnance Research and Development Division is taking full advantage of the properties of these alloys in its endeavor to provide the best and most modern weapons suitable for air transport.

Commercially pure aluminum has a low tensile strength of only 12,000 pounds per square inch, while the strength of aluminum alloys may go as high as 85,000 pounds to the square inch, making them stronger than ordinary steel. Magnesium, a nonstrategic material available from domestic sources in unlimited amounts, is never used for metal purposes in its commercially pure form because of its structural weakness. The principal military employment of pure magnesium, which is highly combustible under certain conditions, is as an incendiary in bombs, rockets, and flares. However, the various magnesium alloys have tensile strengths which range from 27,000 pounds to 53,000 pounds per square inch, have high corrosion resistance to alkaline solutions, under normal atmospheric conditions are somewhat superior to plain carbon steel in resisting corrosion, and with proper surface treatments are usable when the air is impregnated with salt.

To appreciate how it will be practicable to fly guns, tanks, and other equipment over vast distances, even though every scientific and engineering resource is brought to bear on the problem of reducing their weight, it is necessary to consider the increase in the size of aircraft since the C-46, the C-47, and the C-54 cargo planes, which performed the air transportation miracles of the last war. Those giants of their day had a normal cargo capacity of not more than 6,000 pounds, loading had to be done through a door in the side of the fuselage, and it was necessary to disassemble many of the larger pieces of equipment before they could be stowed within the cargo compartment.

New Cargo Airplanes

Now, one of the huge new cargo planes, the C-74, with a maximum weight of 170,000 pounds, can carry 125 armed and fully equipped paratroopers or their equivalent weight of ordnance matériel. Furthermore, present aircraft like the C-82 "Packet" and the C-97 "Stratofreighter" cargo planes can be loaded with cargo directly from the rear or through the nose, permitting the stowage without disassembly of much longer and wider matériel than could have been carried in this form in previous planes.

The Air Force has one of the largest cargo planes yet to be built, the C-124, a 4-engined low-wing monoplane with a tricycle landing gear and a clam-shell door in the nose for loading heavy equipment. In addition, this airplane contains an elevator more than 13 feet

General Sayler is chief of the Research and Development Division of the Ordnance Department, U.S. Army.

long and 7 feet, 6 inches wide on which small vehicles can be raised into the cargo compartment. The ramps, like the main cargo door, are hydraulically operated. The illustration on page 331 shows the ease with which the 155-mm. Gun M1A1, on Carriage M1 can be loaded in the C-124. This airplane is designed to have a gross weight of approximately 175,000 pounds.

Designers of new aircraft are giving more and more attention to the problem of cargo loading in order to achieve the ultimate objective of high-speed air transportation. Multiple loading doors, truck-bed-height floors, full end loading, rectangular cargo compartments, and specialized cargo-handling equipment are results of this design emphasis. However, even with these features augmented by palletized loading, fuselage compartmentation, and other forms of semiautomatic cargo handling, the total loading time will increase beyond the economical limit as payload is further extended. An additional size factor in cargo airplane design is concerned with handling certain heavy and bulky shipments, principally large vehicles and heavy artillery.

Since airborne transport influences the design of nearly all ordnance weapons and equipment, liaison is maintained by the Army Ordnance Research and Development Division with the Army Field Forces and with the U. S. Air Force so that it can keep informed of the plans and means of moving troops and matériel by air.

Design for Flying

All small-arms design is now conducted with regard to air transportability. The designs of rifles, rockets, launchers, machine guns, machine-gun mounts, and other small-arms weapons and equipment are closely examined to determine how lightweight metals can be used without impairing the effectiveness of the piece.

The use of aluminum alloy reduces the weight of rocket launchers and machine-gun mounts by approximately one-half, allowing many more to be carried in a plane. Castings made of magnesium are undergoing test on the 20-mm. aircraft rapid fire gun mount. In addition to the weight saving in transportation, the use of lightweight alloys for automatic ground weapons will permit realistic savings in the weight the individual soldier carries in combat.

While the weight reduction in a single ammunition container may appear negligible, it actually allows a considerably greater number of rounds to be carried by a plane when the weight saving is distributed over many containers.

Consideration of transportation by air is given to the design of all tank and automotive equipment, with due regard being paid to the maximum practicable strengths required of a military vehicle in tactical operations. At present, Ordnance Research and Development is working on a 2½-ton payload truck for airborne use.

The light tank, which weighs twenty-five tons, can be easily carried inside a C-124 cargo plane, but the present medium tank, weighing fifty tons, is not transportable without disassembly. More and more consideration is given to making tanks of those metals that combine light weight with strength and toughness.

This use of new materials applies to engines and to armament. A new engine for the light tank is being built with a lighter transmission and with less bulk. Weight of the 76-mm. gun for the light tank has been reduced by manufacturing it of high-tensile steel.

Every artillery piece is now designed for some phase of airborne operation. By the simple substitution of aluminum and magnesium alloys, savings in weight are realized which allow more pieces to be carried by a single plane. For example, the 105-mm. howitzer carriage M2A2 weighed 5,000 pounds as originally built of steel; by using aluminum and magnesium alloys in various parts, the weight of the carriage was reduced to 3,450 pounds.

The new metals enable engineers to design guns and carriage components lighter than those of the past, achieving weight savings that are sometimes individually small but which, in the aggregate, may have a decisive effect when the need for immediate delivery of divisional matériel is urgent.

By using aluminum wheels on the carriage of the 75-mm. pack howitzer, it is possible to save thirty pounds. Replacement of steel hubs by aluminum hubs cut sixty-two pounds from the former weight of the 155-mm. howitzer carriage. Experimental work with magnesium wheels also offers definite possibilities for improvement. Tests with aluminum trails have shown great promise, as is true of aluminum cylinders for recoil mechanisms which are still undergoing test.

Redesign and use of aluminum in the bipod and traversing mechanism of the 81-mm. mortar has permitted the weight to be lowered thirty pounds. Experimental work is being carried on to develop lightweight base plates made of aluminum, magnesium, and titanium. Although titanium is twice the weight of aluminum, its greater physical characteristics indicate that it may be more desirable in certain circumstances where strength is most important.

In general, although a decrease in the weight and dimensions of guns is being accomplished by the use of lightweight alloys and high-tensile steel, this weight saving is not at the expense of strength, rigidity, or muzzle velocity.

Lighter Fuzes

Practically nothing has been done or can be done to reduce the weight of bullets, shells, or projectiles. Weight is essential to give necessary flight characteristics and for effect at the target so savings in the weight of ammunition must of necessity be restricted to other components. Progress has been made in the design of lighter fuzes, including VT fuzes, by using aluminum and plastics for fuze bodies and mechanisms. Beryllium, a copper alloy, is used in various types of springs in fuzes, and this material is also used for nonsparking tools. Development has resulted in aluminum cartridge cases, originally considered as a substitute for brass cases when brass was a critical item but now of primary interest because of their lightness which enables more rounds to be carried for a given weight.

Great strides toward the perfection of airborne equipment have been made since V-J Day, but the future will undoubtedly see even more innovations brought about by the constantly increasing use of aircraft as a means of transportation. Ordnance Research and Development engineers are striving to anticipate these needs by the design of matériel incorporating in their construction the latest metallurgical and engineering developments as they occur.

Working for Peace

The Thirty-first Annual Meeting of the
American Ordnance Association
will be held at Los Angeles, California
Tuesday, April 26, and Wednesday, April 27, 1949
Headquarters: The Ambassador Hotel

TENTATIVE PROGRAM

Tuesday, April 26th: The Ambassador

Morning: Technical sessions on rockets, guided missiles, electronics. Discussions by leading authorities

Noon: Industrial Preparedness Luncheon

Afternoon: Terminal Island Naval Shipyard

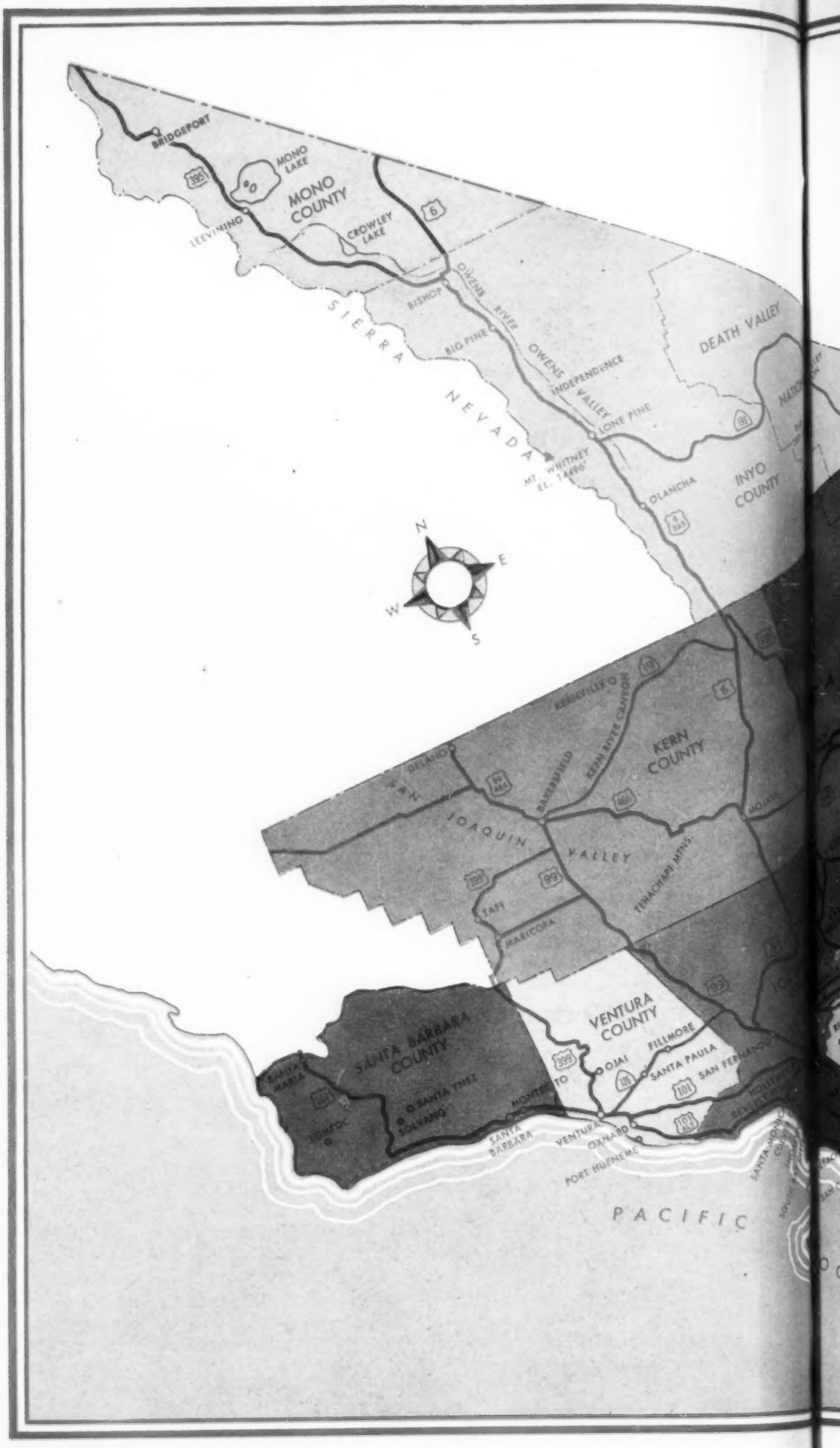
Evening: Thirty-first Annual Dinner Meeting—Grand Ball Room, Ambassador Hotel

Wednesday, April 27th: Long Beach

8 a.m. Leave Ambassador Hotel for Long Beach Naval Base

9 a.m.-10 p.m. A day with the Navy!

Complete details, final programs, and reservation forms will be mailed to all A.O.A. members March 18th


BRIDGEPORT
MONO LAKE
MONO COUNTY
LEEVINING
CROWLEY LAKE
BISHOP
OWENS RIVER
BIG PINE
INDEPENDENCE
OWENS VALLEY
LONE PINE
SIERRA NEVADA
MT. WHITNEY EL. 14496'
DEATH VALLEY
OLANCHA
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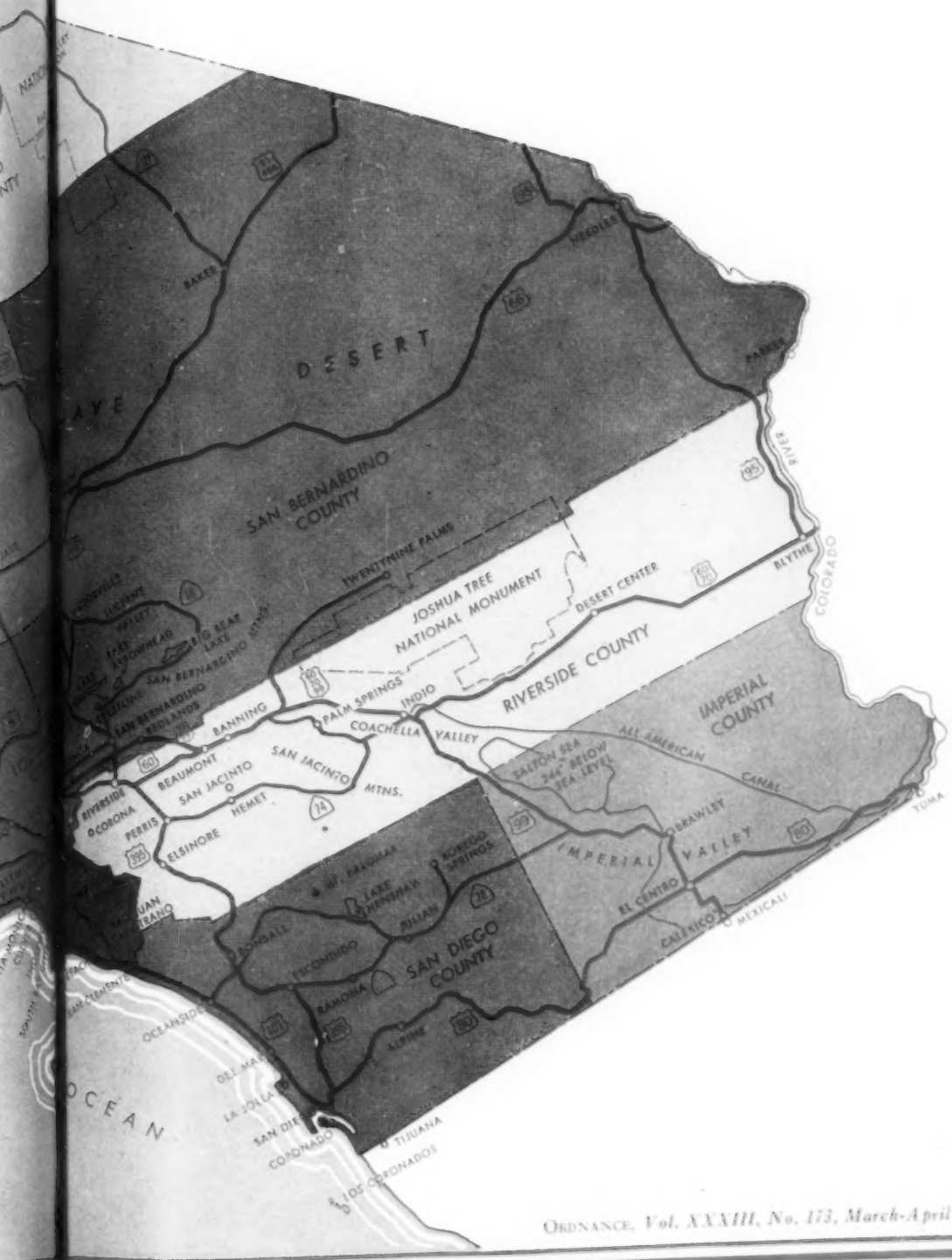
KERN RIVER CANYON
DELANO
BAKERSFIELD
KERN COUNTY
MOJAVE
SAN JOAQUIN VALLEY
TEHACHAPI MTNS.
TAFT
MARICOPA
VENTURA COUNTY
SANTA BARBARA COUNTY
SANTA MARIA
SANTA YNEZ
SOLVANG
LOMPOC
MONTECITO
OJAI
FILLMORE
SANTA PAULA
SAN FERNANDO
SANTA BARBARA
VENTURA
OXNARD
PORT HUENEME
PACIFIC

LOCALE OF THE THIRTY-FIRST ANNUAL MEETING

Los Angeles and Long Beach in sunny Southern California will be hosts to the members and friends of the American Ordnance Association when the Ordnance fraternity convenes for its Annual Meeting in April. The technical sessions, Industrial Preparedness Luncheon, and Thirty-first Annual Dinner will be held at the Ambassador Hotel in Los Angeles on April 26th while April 27th will be spent witnessing a display of Navy matériel at Long Beach Naval Base. Many A.O.A. members will take advantage of their trip to Southern California to visit the numerous scenic and historic spots in this area.



On to Los Angeles!

Ideal Vacation Land Beckons A.O.A. Members in April

Delights of Southern California should lure many to the Thirty-first Annual Meeting of the Association

ALL the newspaper publicity given to a few snow flurries in California last January was a gross exaggeration, according to our native A.O.A. correspondent there. He does not deny that a few flakes fell and that the citrus growers in a few restricted areas lost several million dollars. The weather records of a hundred years were shattered. That was all that happened. As a progressive State, California is always breaking records of one kind or another!

And Californians intend to break other records when A.O.A. members visit them at Los Angeles and Long Beach on April 26th-27th for the Thirty-first Annual Meeting of the American Ordnance Association. They have on order the finest spring in the State's entire history and positively guarantee a dry, sunny, subtropical climate that cannot be duplicated in any other region on the globe!

Days are pleasant and mild during the spring in Southern California. Normal midday temperatures in Los Angeles range from 65 to 66.3 degrees. Instead of slush and snow on the ground, fields are covered with mile upon mile of brightly colored wild flowers.

Varied Attractions

It is possible to stand at the Pacific Ocean, walk through a fragrant orange grove, play in mountain snow, sunbathe in the desert, and have dinner in a Hollywood restaurant—all within a few hours' driving distance.

Visitors will be taken on tours of the great gardens in the beautiful seaside estates of Santa Barbara and near-by Montecito. The gardens will be in full spring bloom, with red, yellow, and cream roses thriving among the flowering shrubs.

An interesting sight at Long Beach, in addition to the Terminal Island Naval Base, is the great rainbow-shaped pier, enclosing a placid lagoon—the world-famous Rainbow Pier.

A.O.A. visitors can watch the seals at Alamitos Bay, Long Beach's pleasure port. And leading off from the bay is the "Naples of America," a group of winding canals with homes surrounded by flowers.

Newport Balboa Harbor is home port for 4,000 pleasure craft, including many belonging to Hollywood film stars.

Excellent Fishing

Oceanside offers excellent pier and deep-sea fishing. Inland is Old Mission San Luis Rey, where desert cactus flowers blend with the roses planted by the padres among the crumbling adobe walls.

Yachting is a springtime sport in San Diego, "Harbor of the Sun." Or A.O.A. visitors can travel to Old Mexico, only a few miles from the heart of the city. They can also visit sun-baked Borrego Valley, a desertland of wildflowers only forty miles from the Pacific Ocean.

Across the bay, at Coronado, approximately 1,500 exhibits of bright, blooming flowers are displayed April 23rd-24th in the Coronado Flower Show. Among the exhibits are beautiful cut flowers, roses, growing plants, special background displays, and a cymbidium display.

Crops which ripen during the warm winter are harvested in spring in the fertile Imperial Valley. This is a below-sea-level land with a lost ocean, the weird Salton Sea. Canals larger than many rivers wind their way through towering sand dunes known as the "Sahara of America." Colored mountains which look like blobs of melting ice rise in the background.

Plaid shirts are in order for Imperial Valley Western Week and Round Up, held April 10th-17th in the community of El Centro, fifty-two feet below sea level.

Travelers on the vast Colorado Desert see green clouds hovering in the distance. When they approach, they find oases of date palms, producing the largest commercial date crop in the Nation. Coachella Valley is called the "Arabia of America."

Near by is the oasis resort of Palm Springs, surrounded by pastel sands. Above is 10,805-foot Mount San Jacinto, capped with snow.

Ramona Pageant

On the other side of Mount San Jacinto are the towns of Hemet and San Jacinto, which lie near green farmlands. Approximately 600 townspeople present the Ramona Pageant, the drama of a girl and her Indian lover, Alessandro. It is given April 23rd-24th, April 30th-May 1st, and May 7th-8th in an outdoor bowl in a mountain valley where the acoustics are so perfect that the audience can hear a whisper.

The annual Desert Easter Parade is tentatively set for April 17th in Twenty-nine Palms. Tots, teen-agers, and adults parade in funny hats, comic costumes, and western clothing in this desert fashion show.

Soquel Canyon opens into a hidden valley in the Chino hills, a few hours from Los Angeles. In spring, modern horsemen make their traditional "Chino Rancho Ride" up the green canyon. The celebration climaxes with a rodeo and barbecue.

Spring in Death Valley

Spring is one of the best seasons to visit incredible Death Valley, a weird cut in the desert. Multicolored mountains tower over below-sea-level playgrounds. The area is covered with beautiful white, yellow, and red wildflowers. Perched on the edge of this fantastic valley, A.O.A. visitors can see the highest and lowest points in the United States at a glance.

Additional information on the vacation lures of Southern California may be obtained by writing the All-Year Club of Southern California, 629 South Hill Street, Los Angeles 14. The organization offers booklets which will help the A.O.A. vacationer in planning his trip and point out the best travel routes through the whole glamorous area.

Navy photo

Arms Standardization

Our Weapons Should Be Adaptable for Use by Our Allies

by

Melvin M. Johnson, Jr.

"The world situation requires the U. S. to carry the primary burden of arms procurement for our allies as well as ourselves"

DURING World War II the United States sent combat units to the far corners of the globe equipped with so-called U. S. standard weapons, to the lists of which from time to time certain entirely new types as well as improved models were added. During peacetime, changes in the list of standard arms usually evolve more slowly, but there are many more radical changes now in process.

Mr. Johnson is the inventor of the Johnson light machine gun and other automatic arms. He is also the author of "Rifles and Machine Guns of the World's Armies," "Automatic Weapons of the World," and other books.

For our own forces, the ultimate ordnance ideal is a highly simplified list of established versatile standard arms including minimum types and calibers from pistol to 240-mm. artillery. Thus production is simplified, training can be accomplished much faster and easier, and supply and maintenance are less complicated.

It follows quite logically that if all those countries which depend upon us for arms are required to use identical U. S. standard weapons throughout their forces, the ideal will seemingly have been achieved.

During the last war we sided with our great allies, the British Empire forces. Except for their use of the U. S. Browning caliber .50 aircraft machine gun, there were few common U. S.-developed arms or calibers between us.

Through Lend-Lease we supplied England with certain U. S. standard items, including vehicles. One U. S. factory produced the British SMLE rifle No. 4, caliber .303, and another made the British rim-type .303 cartridges, a far cry from U. S. standards. Had the British and U. S. forces been substantially "standardized," much confusion, complication, and expense could have been eliminated during the war.

In another aspect, the American taxpayer finds himself directly or indirectly paying out huge sums which must be used for arms procurement in various allied or friendly countries. Whilst our Government desires to provide arms for our friends to preserve peace and prevent future staggering investments in blood and money such as in World Wars I and II, it is not desired that we pay for arms of no military value to ourselves. At least such arms should be substantially of U. S. designs and types.

Hence, as a matter of policy, we do not favor spending our money directly or by way of "adios advances" for nonstandard arms production here, or for either U. S. standard types or foreign-type arms production in countries which may be overrun by our possible enemies, such as in the western European perimeter, the Middle East, or Asia.

The Ideal Solution

Accordingly, we might solve this entire problem by refusing any loans or arms supply to nations unless they use our standard arms, agree to use the arms only as we direct, and further agree not to sell them over to any other country without our approval, at the same time promising to terminate any other arms making and to destroy all nonstandard stocks. That would be an ideal solution, ultimately.

At the close of World War II, U. S. "standard" small arms alone, not above

caliber .30, included three types of revolvers, one pistol, three bolt-action rifles, one semiautomatic (possibly two), one automatic rifle, two or three light machine guns, one water-cooled machine gun, two carbines, and three submachine guns. These required caliber .38, .45, .30 carbine, and .30 cartridges. Included in our lighter antivehicle machine guns, we have for air and antiair use five types in three calibers. Amongst our man-handled mortars we have three types.

The important fact is that we are by no means entirely certain just what our actual standards are at this time. We do know that many items in the current list are obsolescent and will not be retooled when stocks are exhausted.

Surplus Arms Limited

As publicly explained by Gen. Omar N. Bradley, Army Chief of Staff, our so-called war surplus is by no means as extensive as many people suppose, despite our huge production of 1941-1945. Much of our equipment overseas was literally dumped overboard for the rational reasons of cargo space, maintenance, obsolescence, and practical economy. While we have some surplus of certain general supply items, we have relatively little of a pure armament nature, especially in view of our own current standing needs.

At the present time the United States has virtually no active arms industry. Possibly three small commercial concerns are making a limited quantity of "police" pistols and revolvers, yet only one model is strictly "standard."

Our great industrial potential of World War II remains, but it has been inactive since V-J Day. The great explosives producers are on a strictly peacetime basis. None of the commercial sporting-arms factories produce any military arms.

Any trend toward a private armament industry in the United States was sabotaged during 1930-1937 by intensive attacks against munitions makers who were characterized as fomenters of war. Our half-dozen Army Ordnance arsenals have been reduced to peacetime experimental work.

Many industrial organizations have been kept in touch with arms work through far-sighted ordnance research and development contracts, but these, far from profit-making, are often current money losers except as a basis for possible future production contracts.

Early in this century, Germany became very active in arming Latin America. At the time when small arms were modernized by high-velocity ammunition and magazine repeaters, the German Mauser interests achieved a complete coverage of this hemisphere, excluding Canada. Even the U. S. adopted the Mauser system in the M1903 Springfield and closely copied the 7.92-mm. German service cartridge.

Every nation in Latin America adopted the German Mauser in Mauser calibers 7 mm. or 7.65 mm. Mexico, Brazil, and Argentina in particular procured German production tools and eventually produced Mausers and cartridges. In the main, however, the Mauser factory sold these arms directly from Oberndorf.

More recently our Spanish-speaking neighbors have procured a miscellany of American and British military vehicles, aircraft, and naval vessels. Some Swedish arms have been procured, especially the 40-mm. antiaircraft gun (which we also adopted). Brazil obtained complete U. S. armament for several divisions by virtue of sending troops to participate in the Italian campaign.

Trade balances, of necessity, influence our Central and South American friends. Faced with dollar shortages, such nations as Argentina buy Lancaster bombers and Gloster jet fighters from England in exchange for beef and wheat. Moreover, Argentina was not permitted to procure arms here until a year ago. Thus, her Sherman M_4 tanks were obtained in 1946 from England. (We lend-leased those tanks to England during the war.)

The M3 submachine gun can handle U.S. caliber .45 or European 9-mm. cartridges.

The facts of life are simply that our friends to the south have substantial arms items on hand, and factories (especially Mexico, Argentina, and Brazil) are producing certain basic arms. Progress can be made toward common standards in this hemisphere, but considerable time will be required and much patience. Our friends have justifiable pride and an understandable belief that they know more about their own peculiar problems than we do. Just because we have decided on an arms-standards policy does not mean we can ram it down the Latin larynx.

Hemispheric Defense

Latin-American military forces have an important part to play in hemispheric defense, but they are not likely by themselves to undertake elaborate transoceanic offensive operations such as ours of 1942-1945. Hence their arms requirements center more specifically on basic infantry battalion arms, medium aircraft, light artillery, and light vehicles. Also, the horse still has a place in Latin America.

Our policy of inviting all our Latin allies to our military, naval, and air schools, has proved eminently successful, but the effect cannot be immediate.

The Benelux and Scandinavian nations have a miscellany of arms which are the product of their own prewar leftovers, captured German arms, British arms, and U. S. Lend-Lease arms.

In the Middle East, British arms sources are strongly evidenced, but in Turkey and Persia the German-Czech background is found.

In the Palestine area are found British, German, Czech, French, Belgian, Swedish, Swiss, and a few U. S. arms. The Czech arms are mostly new and are sold there with Russian approval.

Further east the countries of India and Pakistan and the other British Empire remnants have principally English arms. China has an assortment of German-Czech-Jap types.

Nations in the Russian orbit use chiefly Russian small arms, but they also have German and Czech types. The Russians have quite a standardization problem of their own.

Analytically, the solution to the problem of international arms standardization amongst the democracies is less

complex in the heavier arms categories such as medium artillery and above, armored vehicles, and aircraft armament. It is more complex in small arms because many of these countries have principally small arms to start with and very little else that would prove effective in modern combat.

The first step in a practical solution is to find common denominators and then fit in the pieces in each case or class of cases. Here are several very brief examples:

1. The U. S. M3 submachine gun was designed so that by easy changes either U. S. caliber .45 or European 9-mm. cartridges could be fired in the same gun. This represents an "adaptable standard" that illustrates the ideal to be achieved.

2. The Johnson light machine gun, without any adjustment other than quick barrel change, fires U. S. .30, 7.92-mm., 7.5-mm., 7.65-mm., 7-mm. (.270), and 6.5-mm. rimless cartridges. With 7.65-mm. and 7-mm., a different detachable magazine is desirable due to taper. The base diameter and extracting groove of all the above cartridges are identical.

3. Mauser rifles are made principally for the 7.92-mm. cartridge, 3.18 inches over all. A slight operation on the magazine plate and a new barrel permits adaptation of the U. S. 3.34-inch .30-'06. The Springfield M1903 and Enfield M1917 rifles can shoot the 7.92-mm. by installing a new barrel or rechambering and boring the old barrel. Browning machine guns can be altered to function with 7.92-mm., 7-mm., and 7.65-mm. cartridges, though shop work is required.

The U. S. and Great Britain both use caliber .50 Browning aircraft guns. The 20-mm. aircraft gun and Navy 20-mm. antiaircraft gun are also our common standards, as is the 40-mm. Bofors antiaircraft gun. Some progress might be made in mortars and artillery standardization.

Fundamentally, the British hope to discard their .303 rim-type cartridge, which they have tried to do ever since 1912! Our caliber .45 is out of step with the 9-mm. used virtually everywhere else, including the British Empire.

Lest it be supposed that in this atomic age too much emphasis is placed on small arms, we must consider strategic facts. Many of the smaller or less industrially developed nations are not, at least for some years to come, well adapted to perform military missions much beyond those in which small arms and light artillery are predominant. Their principal local functions must necessarily focus upon maintenance of internal and local order, prevention of banditry and guerrilla uprisings—all emphasizing small-unit patrol actions and local security missions.

Thus, if we require global airfields and supply bases, the missions of friendly military personnel in those areas are principally the maintenance or establishment of security. The Achilles' heel of any strategic bombing operation will be lack of local base security.

Though on first glance the assertion may seem paradoxical, any forthcoming era of so-called atomic warfare from the air will witness the greatly increased importance of isolated local ground-force operations with light mobile armament.

While the point may be debated in some quarters, it is not practicable in many foreign nations to create a virtual Third Army by the mere process of copying the ordnance lists covering all of Patton's paraphernalia; moreover, even Patton paused when his petrol petered out. This is of course a question of degree and of time. But there are also questions of peoples, politics, education, capacity, and media of supply.

The Economic Aspects

A major question facing the United States today is the fact that directly or indirectly we are paying with our dollars for arms issued or to be made and issued abroad.

In general, since 1945 friendly foreign nations have been permitted to buy arms from U. S. sources more especially since government surplus has been exhausted. Accordingly, foreign military missions have sought to fill their needs from the commercial sources of this Nation which daily deliver huge outputs of autos, iceboxes, juke boxes, stoves, radios, and whatnot. They know our war production record. They logically assume we have arms on the same supply shelf and are amazed that we do not. Arms must, in fact, be tooled up and produced at current prices which are not low! Tooling requires a 9-month period. Production must follow at rates consistent with the quantity ordered. Those are the facts of life inside the U.S.A.

While there are necessarily some objections to putting the United States Government into the arms business, this government, supported by American industry, produced arms on an unquestionably successful basis in 1942-1945, but only after the horse was out of the barn. The full coördination now of an over-all arms-production program by the Government to prevent war by strengthening our allies as well as ourselves is the only sound solution to the problem.

Foreign purchases of arms can thus be comprehensively handled, and "standards" kept to a minimum consistent with global technical and tactical realities. Unit costs can be kept low through volume orders to the whole industry. The U. S. taxpayer will be saved many millions of dollars. Many far-flung beaches which otherwise might be undefended at the possible ultimate cost of U. S. lives and money may remain unthreatened and undisturbed in the hands of their lawful defenders, armed by us.

While it may seem contrary to our democratic principles to vest too much power in the central government as well as to encourage traffic in arms, the facts of life are such that no other logical course is available. The necessity of centralized control and coördination of "standard" arms procurement is, in too many respects, beyond the control or capacity of any private industrial organization against whom the epithet of "munitions monger" would all too soon be hurled by uninformed or subversive groups.

Centralized coördinated procurement by the Government can bring all the elements into full effect. In this connection it is important to distinguish between Government coördination of arms procurement from industry as opposed to Government control of industry, which is not recommended.

This solution necessarily places an increased responsibility upon the military to exercise sound judgment coupled with visionary foresight in the evaluation of standardization techniques. Decisions cannot be mired in a morass of boards and committees. Time is running out!

The Soviet Navy

Is Russian Know-How Able To Build And Maintain a Deepwater Fleet?

by

Burke Wilkinson
Lieutenant Commander, U.S.N.R.

BACK in the spring of 1944 the United States loaned the Soviet Government a cruiser, the U.S.S. MILWAUKEE. By personal order of Franklin D. Roosevelt she was turned over to J. Stalin at Murmansk—the first U. S. warship to enter that beleaguered port during the war.

There were many stories at the time about the naïveté of the Russian shakedown crew which took over. For five weeks the old cruiser served as a classroom, and her American officers and men were targets for hundreds of questions. The Russians wanted to know the purpose of every lever and bolt.

In Miami a group of Russian naval officers, complete with political commissar in the guise of a 2½-striper, attended the subchaser school prior to taking over some Lend-Lease patrol craft. They, too, showed inexhaustible curiosity about the smallest detail. They stripped the guns down to the last screw—and counted the screws. They took the ship's compasses apart and checked the alcohol in them. By sheer persistence they passed the course (all except the commissar!).

But are curiosity and persistence enough? In this world of guided missiles, swift submarines, and planes that outstrip sound, have the Russians the know-how to build and man a modern fleet? Can the Big Bear really swim?

Certain statistics about the Red Navy were reasonably well known before the Curtain clanged shut. We know, for example, that it includes some half-dozen prestige battleships, a score or so of cruisers, at least sixty destroyers (some of them really first-class), several hundred submarines ranging from obsolescent to very new indeed, and assorted coastal craft. The Russians also acquired the unfinished German aircraft carrier, GRAF SPEE. By the book they rank fourth in the fleets of the world, with the United States, Great Britain, and France leading them.

But naval power can no longer be judged on the hoof, as it were, by firepower, displacement, and class of ships. Technical skill, new weapons, strategy, and tradition all play their parts.

Russian Naval Tradition

In a sentence, the Russian naval tradition is one governed by coastal waters and narrow seas. The bursting energy of Peter the Great gave his navy its start in the innermost corner of the Baltic—the Gulf of Finland. This narrow bit of water continued to condition the Russian Navy's outlook long after it had spread its sails on other distant seas: on the Arctic and the Black Seas, the Yellow Sea, and the Seas of Japan and Okhotsk. Russian naval history boasts few great battles on the high seas. Its exploits have mostly centered around the support of coastal fortresses and naval bases, with the fleet acting as a mobile wing to a static defense.

The humiliation of the barnacled and bewildered old Imperial Fleet at the hands of the Japanese at Tsushima Straits in 1905 showed what could happen when the shore-skirting ships of the Czar did put to sea.

During the brief honeymoon between the Nazi and the Soviet régimes from 1939 to 1941, there were symptoms of increasing Russian interest in capital ships. The secret documents of the two governments—recently made public—shed some sharp sidelights on naval affairs. They reveal that Russia asked her German partner for a good deal of battleship material—plans of the BISMARCK and TIRPITZ, heavy gun turrets, and firing directors. But this interest was still largely a matter of prestige, for, when the partners fell out, the Soviet's capital ships in the Baltic and the Black Sea, some six or seven in all, proved almost completely useless although unopposed by any heavy German ships.

Russian interest in submarines is nothing new although scare headlines feature it today. They started experimenting with small submarines early in this century. From 1914 to 1917 their underwater squadrons in the Baltic bled the Germans sorely. Between wars they built large U-boat fleets in the Gulf of Finland and the Far East. They claim some successes against the Germans in the Baltic in the recent war.

Navy Subordinate to the Army

The Russian Navy has always remained an appendix to the Russian Army and subordinate to it. The old Russian capital ships carried this merger with the army to unusual lengths, for their guns were, in some instances, of army calibers ill-suited to naval purposes. This enabled them to draw shells from army arsenals—a perfect example of being kopek-wise, ruble-foolish, resulting in grave undergunning of the ships.

In the realm of strategy, the Russian Civil War rammed home the vital importance of the coastal areas. Every one of the attempts to unhorse the Bolshevik government from 1917 to 1921 was launched from one of these areas and based itself on seaborne lines of communication. The Allied Expeditionary Force bore down from Murmansk. In the Baltic, Prince Avaloff-Bermondt attempted to overrun his fatherland. Generals Denikin and Wrangel knifed up from the Black Sea loaded for Russian bear, and, finally, from the coastal provinces of the Pacific, Admiral Kolchak was able to mount a land offensive which actually recovered the whole of Siberia and pressed beyond the Urals. Small wonder that the Civil War had taught Lenin and Stalin the decisive importance of these natural water gates to the great Eurasian heartland!

Throughout the interwar period Russian policy was designed to close these water gates. They reannexed the Murmansk area and the Far Eastern Maritime Provinces. Not daring openly to overrun the small Baltic states created at Versailles, they used neutrality and friendship pacts to gain control.

They backed Turkey diplomatically against the other powers, at the same time keeping a weather eye on that narrowest sluice gate of all, the Dardanelles—outlet to the Mediterranean, to warm water, and to new fields of conquest.

We now know, from the Hitler-Molotov documents, that Russia's ambitious plans for controlling and protecting her narrow seas received a mighty impulse in 1939. Courted by both the Western Allies and the Nazis, the Soviet leaders were able to exact the maximum price for their favors.

The secret supplement to the pact shows clearly what a hard bargain the Russians drove. They secured Nazi recognition of their control over Finland—the land bridge between the Baltic and the Arctic—and of the small states on the western shore of the Baltic plus the larger part of Poland. The Russians also obtained virtual control of enough of the Balkans to give them a springboard for dominating Turkey and the Straits.

The uneasy honeymoon was over within a year. In the fall of 1940 the partners fell out. By the following summer they were at war.

Record Not Impressive

The record of the Red fleets in the next four years is not impressive. By skillful use of mines and air power the Germans soon bottled up the Baltic fleet, and it was not until the closing months of the war that it was able to take any aggressive action from its Kronstadt base.

The Black Sea fleet put on a better show. Filling their classic rôle of support to the land forces, the Russian ships did good work at Odessa and Sevastopol, bringing in supplies, evacuating civilians and wounded, protecting supply lines. They still remained unaggressive, however, for the Germans were able to evacuate 125,000 men from Sevastopol across the Black Sea to Rumania as late as 1944.

So much for the recent exploits of the Red fleets. What about the future? Strategically the Russians are in a stronger position than even Molotov could have dreamed of back in November of 1940. Their control of Finland is complete. In the Baltic they have incorporated Koenigsberg outright and renamed it Kaliningrad. So, for the first time in their history, they have a Baltic port which is free from ice all the year round. More than that, they dominate the Baltic all the way to the Danish narrows.

But all their attempts to control the Dardanelles have, up to now, broken themselves against the stubborn refusal of the Turks to coöperate. Russian attempts to outflank them in Greece have in turn been thwarted by the close attention of the United States. In Bulgaria and Rumania the Russian protectorates are swinging along. But their King Charles' Head, those Straits of Destiny, remain to elude and challenge them.

Yet the centuries-old program for control of their coastal seas is very near to fulfillment. In the Far East, occupation of the Kuriles, the southern half of Sakhalin, Northern Korea, and their former base at Port Arthur has enabled the Russians to close the strategic Sea of Okhotsk and to strengthen their hold on the Japan and Yellow Seas.

Defensive Rôle

It is clear on the evidence that the rôle of the navy in future Russian strategy will continue to be a defensive one, even if it finds itself with half a world to defend; hence its preoccupation with the submarine.

The submarine today is not what it was back in 1943 when Admiral Doenitz and his U-boats were crushed by the Allies. In the two years following that defeat, German experts worked feverishly to find an answer to radar

Commander Wilkinson is the author of numerous articles on naval affairs and of an adventure novel, "Proceed at Will," which was a best seller in 1948. During World War II he served in the European Theater as Harbor Defense Officer on the staff of Adm. Harold R. Stark.

and the other devices which had spelled annihilation.

The "Schnorkel"

By the spring of 1945 they had a solution to the problem. The new German submarines were as different from the conventional U-boat as a Model A Ford from the old Model T. Their hulls were streamlined and their engines were completely revolutionary in concept and design, tripling the underwater speed. Above all, the new air-pipe, the famous "schnorkel," enabled them to run submerged not just for one or two days but for weeks on end.

Doenitz was too late to reap the benefit of his endeavors: the first batch of these swift killers were on their maiden cruise when the German collapse came. But his submarines returned to base. When they were divided among the victors, the Red Fleet gained access to the secrets which the German Navy had striven for so many years to perfect. And there were plenty of experienced U-boat men to lend the Red Fleet their services and the benefit of their trials and errors.

Some 30 of these new Type XXI submarines are believed to have joined the Red Fleet in 1948, and the Soviet building program is being stepped up to an estimated yearly production of 200 by 1950. It has also been rumored that the Russians are interested in the *Seehund,* the German 2-man submarine which flopped so miserably toward the end of the war. With improvements in speed and seamanship, *Seehund,* which provided the RAF with some fine fish-in-a-barrel shooting back in 1945, might prove more of a nuisance.

Far more serious are the persistent reports of Soviet interest in another German submarine innovation in which hydrogen peroxide is used to supply the engines with oxygen and make possible underwater speeds up to twenty-five knots without use of the schnorkel.

Which brings us again to the question: Are the Russians good enough seamen and technicians to man such intricate craft as the modern submarine?

I turned for help to some of the men who know best—the American deck officers, Diesel men, gunnery experts, and submariners who had occasion to see the Russians in action.

First meet a man who served ten years in the old Imperial Russian Navy, escaping in 1917. One of the finest seamen in our service, he laughed when I questioned him about Russian know-how.

"Know-how? Don't let's fool ourselves, my friend. They have plenty, and, more important, they have discipline, too, and the will to learn. And the Germans to help them learn. I wish I could tell you differently, but today there are as fine seamen in the Russian Navy as in ours, maybe finer. They are bound to their 'great Stalin' by personal loyalties of the most intense kind. They have the spirit of adventure, and they are learning, my friend, learning. . . ."

Now hear an old submariner who had watched some Russian subs down in Panama. "Those Red submarines were taut ships," he told me. "Beautifully kept, clean as a whistle, and smoothly run, too."

The Type XXI submarine, developed by the Germans, may prove to be the Russians most formidable naval weapon.

But my star witness was Lieut. Comdr. Edwin W. Yorke, U.S.N.R., of Enfield, Pa., a Diesel engineer who served in Russia for two and a half years. His written answer to me warrants quoting in some length:

"Generally speaking, their engineering abilities are fair. I met a number of engineering officers in the Soviet Navy and found most of them to be very well qualified. However, I do not believe the enlisted personnel receive enough instruction for their engineering duties. They always impressed me as being slow to grasp anything new.

"I saw one firsthand example of this during a time when we ran some tests on some General Motors 15 KW Diesel generators in Moscow. The Soviets were experiencing a great deal of trouble with their lubricating oils in our high-speed Diesel engines, and we had to run a test to prove to them their oils were unsuitable for use in our equipment.

"The test was run in Moscow, under the supervision of a General Motors technician who we had loaned to the Soviets. The Russians set up two units and also shipped to the test floor all the associated equipment which we had forwarded with the Diesel generator sets. It was our practice to supply them with one hundred per cent spares and, of course, such items as special tools.

"We watched the Soviet Navy personnel trying to hook up these engines and were amazed at their clumsiness and general lack of knowledge. We were very much surprised to find they never opened the box of special tools which were absolutely necessary to hook up the equipment. As you know, our manufacturers will often make a tool for one specific purpose. It might be a special tool to tighten up a single nut. Tools of this type are designed to make work easier, but, since the Russians did not understand what they were all about, they preferred to do it the hard way.

"For some reason the Soviets seemed to have a difficult time installing the equipment we supplied for their shipbuilding program. The principal reasons were the inexperienced type of laborers, a general lack of know-how, and, probably more important than anything else, the bureaucratic, party-dominated administration.

"The first step to an insane asylum would be the job of running a Soviet shipyard. I had nothing but pity for the unfortunate fellows who were supposed to be in charge of their shipbuilding programs. Some of them were what we would call 'good Joes,' but how they ever got anything accomplished, hamstrung as they were with red tape and limited with very poor labor, is beyond me."

Soviet Skill Increasing

But, as my correspondent points out, some years have passed. Considering the millions of tons of equipment we poured into Russia during the war and the help we supplied with the equipment, it is not surprising that their know-how is on the upgrade. Or, as Commander Yorke put it:

"As far as the Soviets building naval vessels of reasonable efficiency, I feel quite confident they are capable of doing this with or without German help. In addition to the tremendous amount of naval equipment given them during the war, they no doubt picked up a considerable amount of know-how from every manufacturer supplying the navy with materials."

It would, perhaps, be a mistake to think of the Big Bear as a long-distance swimmer yet awhile, but he's learning a lot of new tricks. He's dabbling his paws in those four deepwater play pens of his. One of these days he may really go swimming on his own.

Keepers of Peace

America's Industry and Armed Forces Can Halt Aggression

by

Maj. Gen. G. M. Barnes

Formerly chief of Army Ordnance research and development, now engineering assistant to the president of Edward G. Budd Company

"American industry, kept strong, vigorous, and prepared by industrial mobilization, will determine whether we will have peace or war in our time"

ONE of the great military writers of all time was a German, Gen. Karl von Clausewitz, who lived at the time of Napoleon and was present at the Battle of Waterloo. He is, however, better known as a writer on military subjects than as a field general. He wrote several books, among which was "Vom Kriege" on the philosophy of war. General Clausewitz had a conception which has been helpful in obtaining a better understanding of the world political situations in relation to war. He stated, in effect, that "war is but a continuation of a nation's peacetime policies."

Applying this reasoning to the present situation, we see that Russia's peacetime policy is world revolution. Our peacetime policies are to see to it that Russia is not able to carry out her peacetime policy of world revolution through Communism and to ensure that the men of all nations will remain free and capable of choosing their own forms of government. Thus, according to the General, already we are journeying down the road that leads to war with Russia. We explain this situation by calling it a "cold war," and we sincerely hope that we will be able to prevent its being turned into a "hot" or shooting war.

The Atomic Bomb

There are two principal deterrents acting today to prevent Russia from converting the cold war into a shooting war. The first deterrent is the atomic bomb. It is necessary to consider the atomic bomb because for the first time in the history of mankind the United States has a weapon with which, in an instant, we can destroy one square mile of the earth's surface and all of value to man upon it. With the application of several bombs we can destroy any city or any group of manufacturing facilities in any country.

Russia says she has an atomic bomb, but few of us believe it. Fortunately for us, it requires more than a knowledge of fundamental nuclear physics to make the bomb. Great industrial facilities, instrumentation, and know-how are necessary, all of which Russia largely lacks. Thus, at least several years will pass before Russia can have the atomic bomb. Let us hope that during these years our Government, in its wisdom, will retain a tight hold on this secret for our national security and perhaps existence.

I am not of the school, however, that believes the bomb is sufficient within itself in war. If a new war should come we will need all kinds and types of weapons in greater quantities than ever before.

Another Preventitive

The second road block acting to prevent Russia from declaring open warfare is American industry. The German Kaiser in World War I, unfortunately for him, did not have an extensive knowledge of American industry and what it meant in modern warfare. The Kaiser believed that he could win before American industry could be made effective by conversion. As it was, the war did not last long enough to develop fully the potential capacity of this country as a war industry. Adolf Hitler had never been outside his own country. He did not understand the power of American industry, and he was unwilling to be guided by the opinion of his experts. He, too, thought that he could gain his objectives before we could make our industry effective in the war.

Mr. Stalin is better informed on this subject. He has been on the receiving end of American industry. He knows in his heart, as do his generals, that except for the vast quantities of trucks, tanks, artillery, ammunition, and, perhaps above all, high explosives, Russia

General Barnes

"The Cincinnati Post acclaims you, General Barnes, for your long years of faithful service to the Ordnance Department of the United States Army throughout World Wars I and II and the years between for your engineering skill in the development of superior antiaircraft and mobile seacoast artillery in which fields you pioneered many far-reaching theories and practical applications.

"For the skill with which you helped to direct the early stages of industrial mobilization for the production of ordnance a decade ago—well in advance of the tragedy of Pearl Harbor.

"For the noteworthy success you attained as the head of the entire Research and Development Service of the Ordnance Department of the Army during World War II when, in coöperation with science and industry, weapons of superior quality were designed and built for our American fighting forces and the United Nations.

"And, finally, now that you have retired from active military service and fill a most important post in American industry, for your continued loyalty and coöperation in all matters for the advancement of ordnance preparedness and thus for the peace of our country."—*Citation accompanying the presentation to Maj. Gen. G. M. Barnes of the Charles L. Harrison Medal for Distinguished Ordnance Service by the Cincinnati Post, American Ordnance Association, Cincinnati, Ohio, December 9, 1948.*

would have gone down in defeat before the German armies. In the only burst of enthusiasm ever known from Mr. Stalin, he stated in 1945, "Without American industry there could have been no allied victories."

In order to make American industry effective in war, it is necessary that certain essential measures be carried out in time of peace, and I would like to review these measures with you.

As the late Brig. Gen. John H. Rice, chief of manufacture in the first World War frequently said, "in war, time is of the essence." If we distill the whole program of industrial mobilization, we find that the essence is the saving of time. In fact, it might well be said that the principal objective of the American Ordnance Association is the saving of time in a war emergency.

The Important Step

Perhaps the most important of all steps to be taken in time of peace in regard to industrial mobilization is the balancing of the war reserve. The war reserve constitutes a very neat engineering problem. What is the war reserve? It is the stock of fighting equipment necessary to equip the troops mobilized between M-day and the time when the mass production of equipment begins in industry. This period is roughly ten to twelve months in duration.

Before the war reserve can be determined, the several combat arms must formulate their war and mobilization plans for this same period. When this mobilization planning has been accomplished it is then possible for the technical services to compute their requirements. Not all types of weapons require the same time for manufacture, and therefore the quantities vary widely with the items. Those which can be produced quickly should not be included in the war reserve for obvious reasons.

A balanced war reserve permits the rapid employment of our forces without waiting for the mass production of munitions from industry during this period. The several technical services are now sending out orders for the procurement of equipment for the balancing of the war reserve.

All manufacturers have a special responsibility that these orders are accepted and completed as promptly as possible. Manufacturers should take these orders from the technical services even though they might cause some embarrassment or interfere with commercial production.

Another important factor in our peacetime mobilization plan to make American industry fully effective is the stock-piling of strategic materials. Prior to World War II the War Department had adequate plans for stock-piling of such materials. Unfortunately, the funds were not appropriated by Congress for these plans in time to make them effective. It is true that limited funds were appropriated in 1938, such as for stock-piling crude rubber, but the funds were not adequate.

For example, the War Department had planned for a stock pile of 850,000 tons of crude rubber. If we had had this, there would have been no shortage of rubber throughout the war. As it was, we were occasionally in very critical situations due to the time required for the development of synthetic rubbers, and often we were only two or three months ahead of a real crisis.

All of us should take an interest in the stock-piling of critical materials. We now have adequate plans, but only some twenty-five per cent of the program has been effectuated to date. We should see that our citizens understand what this means to the country. Members of Congress should be persuaded to vote for stock-piling. These stock piles of critical materials do not deteriorate, and it is simply a case of taking money out of one pocket and putting it in another, and it is certainly more important than the stock piling of gold.

There are a number of other items in our industrial mobilization plan which need discussion. It is perhaps presumptuous to mention these items because no doubt many industrialists already have accomplished this work and perhaps have passed beyond these activities in their planning. At the risk of repeating that with which you are already familiar, I will review the items which I consider most important.

Each manufacturer should study the items which he produced in World War II, noting the quantities and the dollar value. The latter should be brought in line with present-day prices. Each manufacturer should then red-pencil any item he was not highly successful in manufacturing.

If you are a large manufacturer, sooner or later representatives of the Munitions Board will call at your plant for the purpose of stating the items which the Board would like to have you manufacture, based on your World War II experience. If you are a subcontractor then you should get in touch with the prime contractors for whom you worked during the last war.

After the representatives of the Munitions Board have tentatively given you the items to be manufactured then you should determine with the representative of the technical service selected as chairman—ASPPO—what items you are best qualified to manufacture and the quantities thereof.

Prepare for Production

After these determinations have been made, the next step is for you to lay out your production lines at least on paper. You should carefully review your machine-tool requirements. It is possible that in connection with the manufacture of your own product you will have requirements for new machine tools. Study these in relation to your war program—perhaps you can cover both through wise selections.

It would be impossible to prepare for an emergency down to the last item, but it is vital that the larger provisions should be accomplished. Several years of the cold war may be ahead of us. It is of vital importance that reasonable funds be appropriated year after year for a steady growth and strengthening.

The United States and Russia are traveling along the road which leads to war. Russia insists on bringing about a world revolution, which we oppose, but at this writing does not dare to start a shooting war. The skill with which we manage that great deterrent to war, *American industry kept strong, vigorous, and prepared by industrial mobilization,* will determine whether we will have peace or war in our time.

"American industry, within the confines of the Cincinnati Ordnance District, always has played a vital and interesting part in the advancement of industrial national preparedness. The Cincinnati Post of the Association is one of the oldest of the thirty local posts throughout the country. It was founded twenty-three years ago and tonight we are celebrating its birthday. I feel very much honored in having been invited to join you on this occasion.— ***Maj. Gen. G. M. Barnes before Cincinnati Post, A.O.A., December 9, 1948.***

Month by Month: A Review of the National Defense Situation

REPORT ON NATIONAL SECURITY

The Eberstadt Board, which has been studying the new National Security Organization, recently made its report to the Hoover Commission on Organization of the Executive Branch of the Government.

The Eberstadt Board is headed by Ferdinand Eberstadt, former Chairman of the Army and Navy Munitions Board and Vice-Chairman of the War Production Board. Among its fourteen members are some of the country's foremost official and industrial figures in the recent war effort. Its eighteen advisers and consultants include General of the Army Dwight D. Eisenhower and Fleet Admiral Chester W. Nimitz.

The Board held many meetings attended by over 245 witnesses. Its staff of twenty-five persons engaged in many additional interviews and much research.

The Eberstadt Board has proposed that steps should be taken (1) to clarify and strengthen the authority of the Secretary of Defense over the military departments and their civilian Secretaries; (2) to overhaul military budget practices and procedures from top to bottom; (3) to improve "teamwork" throughout the National Security Organization; (4) to relate scientific research and development closely to strategic planning; (5) to expedite plans for civilian and industrial mobilization in case of war; and (6) to make adequate provision for and against new and unconventional types of warfare in the future.

The report also emphasized that "civilian control of the Military Establishment must be clearly established and firmly maintained."

The Eberstadt Board considered and recommended *against* (1) a single military Chief of Staff with a General Staff in command of all three military services; (2) merger of the three military departments into a single department; and (3) merger of the Naval Air Arm with the Air Force.

Board recommendations do not necessarily represent the views of the Hoover Commission and, in some cases, may be modified or altered in the Commission's report to Congress.

"Civilian groups with an interest in the National Security Organization present an imposing array of resources and activities. There are over two hundred such groups, of which the American Ordnance Association, the Navy League, and the Air Force Association are the better known. . . The best of these organizations have a useful place in the information-public relations picture.

"The American Ordnance Association, for instance, which recently changed its name from the 'Army Ordnance Association,' has displayed splendid leadership, fine coöperation, and an earnest desire to lead the services and the unofficial associations outside the services to unification in spirit. Other organizations might well emulate its example."—*Report to the Hoover Commission on Organization of the Executive Branch of the Government by the Eberstadt Board on the National Security Organization.*

ATOMIC ENERGY COMMISSION

An industrial advisory group was requested to survey the United States Atomic Energy Commission's activities and make recommendations for increasing industrial participation in the atomic-energy project.

The report of the group was published on December 30, 1948, and contained the following conclusions and recommendations:

1. The Atomic Energy Commission has made commendable progress. The contract system already gives industry an important part in the program. However, the only field of opportunity open to industry generally is in developments associated with radioisotopes.

2. Greatly expanded industrial participation is needed both for the purpose of giving the Commission maximum assistance in solving its problems in the interest of national security and for the purpose of assuring a rate of technological advance in atomic energy comparable to that which the country has enjoyed in other fields.

3. The essential precondition to increased industrial participation is knowledge of the subject, so that industry may recognize opportunities to take part as they arise. Much information has already been published by the Commission, but most of it is not in a form that is useful to industry. In addition, a vast amount of nonsecret information of potential value to industry is buried in the files and activities of the Commission.

4. In order that published information about the Commission will be complemented by concrete first-hand personal contact with the subject, the Commission should develop a broad program for clearance (subject to appropriate security restrictions) of engineers, technologists, and executives in the interested industries. These include chemical, petroleum, power, heat-transfer equipment, metallurgical, and instrument industries.

5. A general industrial advisory committee should be established by the Commission, and special and temporary industrial advisory committees should be created to work on specific problems.

6. The Commission should give particular attention to acquainting industry with the specific measures it is now taking to improve and strengthen its contract system of operation. A further report on the patent situation as it affects industrial participation is needed.

7. The Commission's recent reorganization of staff is undoubtedly a decided forward step but does not go far enough to result in maximum efficiency either from the standpoint of the Commission's internal operations or from the standpoint of increasing industrial participation in atomic-energy development.

ADVISORY COMMISSION ON SERVICE PAY

About a year ago, Secretary of Defense Forrestal stated that the National Military Establishment had before it the very critical and immediate problem of determining the adequacy of the compensation received by members of the armed services and the soundness of its general military pay structure.

The Secretary made two particular points: (1) there had been no over-all change in the pay structure of the services in forty years; and (2) the

services were suffering a loss of competent personnel to private business because of inadequate service pay.

Following this statement of his views, Mr. Forrestal established an Advisory Commission on Service Pay under the chairmanship of Charles Hook, president of the American Rolling Mill Company, Middletown, Ohio.

Taking into consideration the size of the job, the Commission felt that all its members could not devote a lot of time to the same subject. Each member therefore agreed to take the lead and sponsor a certain part of the program.

Rev. John Cavanaugh, president of Notre Dame University, accepted the task of tracing the career of college graduates and that of the graduates of West Point and Annapolis. This study developed facts which were very favorable on the side of the graduate who chose an armed service career.

It would seem that an armed service career is attractive to younger men but that older men were resigning their commissions because of the more attractive pay scale in private business.

The Commission, having studied all phases of the problem, recommended a program that it believes to be sound and in the interest of the services and the taxpayer. One of its most important recommendations is that a personnel board be appointed under the Secretary of Defense, and reporting directly to him, to continue the study of the subject so that the program can be kept currently in balance.

ARMED SERVICES LEGISLATION

A broad legislative program ranging from aid for Western Europe to rain-making experiments has been recommended by Defense Secretary Forrestal.

The integrated program includes a total of thirty-six major legislative proposals, fourteen of which are labeled "top priority."

Two proposals are now under study: (1) general legislation authorizing the United States to provide military assistance to its allies or to countries with international interests similar to those of the United States; and (2) an extension of existing law to permit the President to send military and naval missions to all countries which request them for assistance in military planning.

Strictly military legislation of a "top priority" character includes the following important topics:

Construction Authorizations.—All three services are preparing legislative requests for authority to construct more housing and to fill other such needs.

Doctors and Dentists.—Legislation to provide more adequate medical and dental services for military personnel.

Pay and Allowance of Military Personnel.—Temporary extension of the current income-tax exemption, followed by an upward revision in service pay and standardization of pay and retirement provisions for all the services.

Civil Defense.—Legislation to implement recent recommendations made by the temporary Office of Civil Defense Planning.

Radar Fence.—Air Force legislation to permit the establishment of land-based air-warning and control installations and facilities for the air defense of the continental limits of the U. S.

Reserve Components.—Legislation implementing recommendations made by the Committee on Civilian Components headed by Gordon Gray, Assistant Secretary of the Army.

Air Force.—Basic legislation which will establish Air Force military and civilian strength.

Military Justice.—A bill which would establish the substantive and procedural scope of U. S. military law.

Army Reorganization.—Legislation to replace those provisions of the National Security Act which expire June 26, 1949.

Wind Tunnels.—Legislation to authorize the construction of wind tunnels at selected educational institutions, at Carderock, Md., and at a new Air Engineering Development Center.

Research and Development.—Legislation to replace current inadequate authority in all departments to conduct the research necessary to keep pace with changing technological developments.

Charter of Vessels.—Legislation to authorize the Army and Navy to charter certain vessels of the U. S.

SATELLITE WARFARE

American scientists are studying the feasibility of creating man-made satellites to be utilized in the Nation's defense.

A brief reference to the "Buck Rogers" studies was made by Secretary of Defense Forrestal early in January when he said: "The Earth Satellite Vehicle Program which is being carried out independently by each military service was assigned to the Committee on Guided Missiles (of the Research and Development Board) for coördination and to provide an integrated program with resultant elimination of duplication."

In his first report, Mr. Forrestal stated that "the committee recommended that current efforts in this field be limited to studies and component designs; well-defined areas of such research have been allocated to each of the three military departments."

Speculation was that a man-made satellite might be suspended in space, held in place by gravity from the earth and the moon. Such a satellite might be utilized as a control station for long-range guided missiles.

MATS

The Military Air Transport Service—first large-scale project in the unification of the Armed Services—has presented its initial quarterly report (July 1 through September 30, 1948) to the Secretary of Defense.

The report records in detail the progress made in solving the problems brought about by the consolidation of the wartime Air Transport Command and the Naval Air Transport Service into a single military organization commanded and manned by both Air Force and Navy personnel.

The total strength of MATS was given as 61,295. Approximately 700 aircraft are assigned to the military transport organization.

On July 23rd, less than two months after MATS had been formed, it was directed to provide personnel and aircraft to augment the "Operation Vittles" airlift of supplies to blockaded Berlin.

By September 30th more than 3,100 officers and airmen and 143 C-54's of MATS were engaged in the airlift. This was about eighty per cent of all qualified C-54 transport crews and thirty-six per cent of maintenance personnel. This placed forty-eight per cent of all MATS personnel in overseas duty as against twenty-eight per cent of the Air Force as a whole.

The heavy demands of Operation Vittles afforded excellent training for MATS flight and ground crews. Valuable experience was gained by all personnel.

George C. Marshall

PERSHING, then Commander-in-Chief of the American Expeditionary Forces in France, was confronted with a stupendous problem in logistics in September 1918. The first all-American offensive had just successfully reduced the St.-Mihiel salient—a dagger pointing at the heart of France for four long years. Winter was approaching, but a quick thrust in the Meuse-Argonne sector, if successful, might bring World War I to a victorious conclusion and avoid another winter in the trenches. The problem was to move out 220,000 French soldiers and their equipment and replace them with 600,000 Americans and their equipment—"without arousing the suspicions of the enemy."

History records the successful solution of this gigantic problem in logistics within ten days—thus ensuring victory and peace by November 11, 1918.

Pershing, never fulsome in praising his subordinates, is of record that "The movements of troops connected with this concentration were worked out and their execution conducted under the able direction of Col. George C. Marshall, Jr., of the Operations Section of the General Staff, First Army."

This early experience in providing the right things for the right people in the right places at the right time—a somewhat oversimplified definition of logistics—served Marshall well when, as Chief of Staff, United States Army, he was faced with the greatest problem of logistics in all history—the movement of personnel and matériel to 127 overseas ports over lines of communication aggregating 56,000 miles. Marshall's final report as Chief of Staff as of September 30, 1945, proved that he had grasped the paramount importance of logistics which throughout World War II dictated the strategy and plans and determined tactics—the actual fighting on the field of battle.

Marshall's statement on June 5, 1947, demonstrated that his encyclopedic mind had grasped the opportunity not merely to win a war—but to avert war altogether. In advocating what the stricken peoples of Europe affectionately and rightfully call the "Marshall Plan," he located and hit the jugular in stating: "Our policy is directed not against any country or doctrine but against hunger, poverty, desperation, and chaos. . . . Furthermore, governments, political parties, or groups which seek to perpetuate human misery in order to profit therefrom politically or otherwise will encounter the opposition of the United States."

The so-called "cold war" has been termed "the logistic phase of World War III." If successful, we may avert World War III—for, in the somewhat ominous future, our "logistics of peace" may well prove to be the science of survival.

Marking up the misses as well as the hits, all fair-minded Americans must in their hearts join the President of the United States in naming George C. Marshall as "the outstanding man of the World War."

James L Walsh

President, American Ordnance Association

New Wings for the Air Force

The swept-back-wing XF-88 twin-jet fighter has a span of 40 feet and is about 55 feet long.

The XF-89 all-weather jet fighter has a 50-foot wingspan, is 50 feet long and 15 feet high.

This F-80 has a unique rocket launcher mounted in the nose. Rockets are loaded automatically.

This mock-up of the X-4 twin-engined jet research plane is patterned after the flying wing.

The XC-120 detachable-fuselage transport is being developed for fast delivery of men and cargo.

The T-28 trainer is designed for a top speed of 292 m.p.h. and a ceiling of 31,650 feet.

Association Affairs

THE NAVAL ORDNANCE RESEARCH LABORATORY at White Oak, Md.—938-acre place of wonders just outside Washington, D. C.—held visitors' day and open house on Monday, January 31, 1949. And a great scientific establishment it is. Rear Adm. Frank E. Beatty is in command; Dr. R. D. Bennett is the technical director. The Washington Post of the American Ordnance Association, led by its president, F. W. Foster Gleason, and its secretary, Howard Crager, was present in large numbers.

Here is a summary of demonstrations, exhibits, and informal talks (10 A.M. to 4 P.M.). *Acoustics:* Low-frequency investigations. *Aërodynamics:* Supersonic wind tunnels, transonic and pressurized ranges, wind-tunnel nozzle construction. *Ammunition instrumentation:* Quality control in initiators, hermetic sealing of fuzes, ballistic pendulum, spark sensitivity of explosives. *Performance testing of ordnance:* X-ray technology and equipment, nondestructive testing, magnetic field simulation. *Explosives:* Detonation studies and facilities, shock-wave studies. *Hydrodynamics:* Water-entry research, theoretical studies, variable-pressure tank. *Magnetism:* Magnetic field simulation, geomagnetics research, nuclear magnetic resonance. *Optics:* Wind-tunnel optics, infrared research facilities. *Plastics:* Materials research, process development. On all sides there was enthusiastic acclaim for this newcomer in the ranks of ordnance establishments and high praise for the staff and other personnel of the Naval Bureau of Ordnance.

Members of Washington Post of the Association were joined by personnel of the Electronics Division of the National Bureau of Standards in the first meeting of the Post's 1948-1949 season. This was held in the lecture room of the Bureau's East Building on the night of December 15, 1948. Brig. Gen. A. A. Kessler, Jr., Director of Procurement and Industrial Planning, United States Air Force, spoke on "Ordnance Procurement in the Air Force." Lieut. Charles E. Menihan, U.S.A.F., described the technical operation of the Berlin Airlift, from which he had recently returned. Both talks were followed by enthusiastic question periods. The showing of an Air Force film and the first presentation of the pictorial record of the Thirtieth Annual Meeting of the A.O.A. at Selfridge Air Force Base in June 1948 completed this most instructive evening.—F. W. F. G.

ED B. GALLAHER, who recently relinquished authorship of the Association's monthly AMERICAN ORDNANCE LETTER, is receiving praise from all sections of the country for his fine leadership and regret that he could no longer write his popular analysis for A.O.A. members. His January Letter on "Inflation—'Money'—Gold" is in exceptional demand. Frank Hecht, president of the Navy League of the United States thought so well of it that he sent a copy to each member of the League, and a large steel company requested 30,000 copies. Another well-deserved tribute was paid Mr. Gallaher when he recently was made a life member of the Automobile Old Timers. We quote the following item from the *Norwalk Hour* (Norwalk, Conn.) of January 8, 1949:

"The society known as the Automobile Old Timers, of which Alfred P. Sloan, past president and now chairman of the board of General Motors, is head, announced today that E. B. Gallaher of Kensett Avenue has been made a life member. Mr. Gallaher is president of the Clover Manufacturing Company.

"It was established by A. O. T. that Mr. Gallaher was among the first two or three in this country to have built a 'horseless carriage,' his car having been constructed in 1895 and given its road test early in 1896, at which time he organized the Keystone Motor Company of Philadelphia, Pa.

"During the next three years Mr. Gallaher made and sold quite a number of Keystone cars. Then in 1900 a new company, Searchmont Motor Company, was organized to take over Keystone Motor Company to provide additional capital and increased facilities, and Mr. Gallaher became its vice-president and general manager.

"Searchmont Motor Company grew rapidly, employed several hundred hands, and produced and sold many hundred cars until 1905 when it was merged with other motor car manufacturers.

"Mr. Gallaher's official membership card, signed by Mr. Sloan, states that his first car was built in 1895, thus officially recognizing him as being one of the first three or possibly four men in this country to design and manufacture a motor car, and, incidentally, he is probably the only living member of this original group of pioneers who established the automobile industry.

"At the time Mr. Gallaher started to manufacture his car, there were few horseless carriages in the country. He made the first trip by auto from Philadelphia to New York City and the first from Philadelphia to Baltimore and Washington.

"Mr. Gallaher was a founder-member of the Automobile Club of America, the first automobile club in the country; he was the American delegate of the Motor Union of Great Britain, the Touring Club of France, the Touring Club of Germany, and the Touring Club of Switzerland. In 1906, he established offices in London, Paris, Berlin, and Stuttgart. He represented in America the Richard-Brasier Works of Ivory-port, France, which built the Gordon Bennett Cup winner and twice thereafter the winners of the French Grand Prix.

"Mr. Gallaher sold out, married, and settled in Norwalk in 1910, having acquired sufficient funds to retire, but his retirement was short-lived. He revitalized his Clover Manufacturing Company the following year and built it into a prosperous organization enjoying a high reputation in world trade."

THE STUDENT ACTIVITIES COMMITTEE of the Chicago Post took a very historic step January 17, 1949, when a meeting was held at the University Club, Chicago, with faculty representatives of the Illinois Institute and Northwestern University.

The following members were present: Wm. Ryer Wright, chairman; M. J. Allen, G. R. Catlett, G. D. Dearlove, J. W. Karraker, E. J. O'Keefe, H. J. Prebensen, W. G. Swartchild, Jr.; and these guests, George Dowding, Carnegie-Illinois Steel Corporation; Dean O. W. Eshbach, Northwestern Technological Institute; Henry T. Heald, Illinois Institute of Technology; Prof. Burgess Jennings, Northwestern Technological Institute; H. W. Johnson, Inland Steel Company; W. J. King, Carnegie-Illinois Steel Corporation; John H. Reese, Revere Copper & Brass, Inc.; Dean Retaliata, Illinois Institute of Technology; E. Q. Sylvester, Griffin Wheel Company.

The meeting was opened by Colonel Wright who gave a brief description of the American Ordnance Association and outlined the history of the Student Activities Committee's progress to

date. The guests for the day were introduced, and the student activities program as currently set up was completely discussed. The faculty representatives of the Illinois Institute and Northwestern University indicated that they would have the student members selected and a list submitted of their selections within a month. Floor discussion on this point brought out the fact that such selection should also include graduate students and students in the science fields as well as the engineering fields.

It was the consensus that the faculty counselors should tell the selected students that they would receive an invitation to the annual dinner of the Post, attendance at which would be at no cost to the student. This decision was based on considerable discussion by all those present, including the guests who felt that the cost of the dinner tickets for the students could be met by individual and company contributions.

THE ORDNANCE FRATERNITY OF BIRMINGHAM, Ala., held a gala meeting December 8, 1948, at the Birmingham Country Club. All the traditions for which this group are well known were followed. Col. Tom Nesbitt, president of the Post presided. The principal speaker was Maj. Gen. A. B. Quinton, Jr., chief of the Industrial Division of the Ordnance Department of the Army. Well-versed in ordnance procurement and production, having served as a special assistant to the late great Lieut. Gen. William Knudsen and later as chief of the Detroit Ordnance District during World War II, General Quinton discussed the plans and policies of the Army in relation to present Ordnance programs. Formerly commanding general of the Aberdeen Proving Ground, he is thoroughly conversant with the ordnance situation in all its many phases.

Col. William J. Rushton, chief of the Birmingham Ordnance District, addressed the meeting and presented the former district chief, Col. Thomas M. Jervey, U. S. Army, Ret.

Before adjournment the following officers and directors were elected for 1949: President, H. P. Bigler; vice-president, R. C. Stobert; directors: Bradford Colcord, C. S. Lawson, R. W. Coward, M. E. Pratt, T. M. Nesbitt, Robert Gregg, R. D. Hickman, Oscar Wells, T. W. Martin; treasurer, R. D. Cotten; secretary, R. E. Parker.

All in all it was a very informative and highly enjoyable occasion of the type for which the Ordnance fraternity in Birmingham is noted.

AT LONG LAST the labyrinth of service procurement is being simplified—after a fashion. An "Index of Military Procurement," showing which military purchasing offices have been assigned the responsibility for buying products now covered by the Army, Navy, Air Force coördinated purchasing program, was made public recently by the National Military Establishment. The Army has fourteen decentralized purchasing offices, the Navy nine. All Air Force purchasing is at Dayton, Ohio.

> *Under the coördinated program each service has been assigned certain items to buy for all three Departments. In some cases the purchases are made jointly. For example, the Navy buys hand tools for the three Departments, the Army buys automotive equipment, and the Air Force buys photographic equipment. As an example of joint purchase, the Armed Services Petroleum Purchasing Agency buys petroleum and lubricants for the Army, Navy, and Air Force.*

All assignments which were in effect on January 1, 1949, are shown in the index, which is printed on a single sheet of paper for handy reference. Addresses of the purchasing offices which will do the buying also are given. The index shows that under this program, which is being coördinated by the Munitions Board, nearly ninety major products have been assigned among the three Departments. These cover most of the principal items now being purchased for use of the services.

This new military buying method is expected to simplify purchasing procedures and make contacts with the services easier for businesses having products to sell. Copies of the index may be obtained from the Munitions Board, National Military Establishment, The Pentagon, Washington 25, D. C.

THREE ORDNANCE STALWARTS PASSED AWAY recently and the Ordnance fraternity is the poorer by their absence. Judge Lewis Harlow Van Dusen of Philadelphia died December 12, 1948. William L. Stancliffe of New York died there January 16, 1949. Both were charter members of the Association. Adm. Joseph Strauss, U.S.N., Retired, died at the Naval Medical Center, Bethesda, Md., December 30, 1948.

Judge Van Dusen was commissioned in the Ordnance Department of the Army in May 1917 and was in charge of the employment of thousands of civilians. He had served as Civil Service commissioner of Philadelphia for a number of years previously. Following the war he became a legal adviser to the Ordnance Department in the settlement of war claims. In 1920 he returned to private practice of law in his native city. Shortly thereafter he was elected judge of the Orphans Court of Philadelphia County for a term of ten years beginning in 1925. He had the distinction of being reëlected for two 10-year terms in 1935 and 1945.

Mr. Stancliffe was formerly a vice-president of American Car & Foundry Company. He became manager of sales for the company in 1939, a great part of his energy and ability being devoted to the production of ordnance and other equipment for the armed forces. He directed all contractual relations between the company and the United States Government.

Admiral Strauss was former Commander in Chief of the Asiatic Fleet and Chief of the Bureau of Ordnance, U. S. Navy. During World War I he was in command of the mine force of the Atlantic Fleet which laid a barrage of mines between the Orkneys and Norway. He served in the Spanish-American War and held various cruiser and battleship commands until 1916 when he became head of the Naval Ordnance Establishment.

Considered one of the Navy's foremost ordnance experts, he invented the first spring-recoil gun mount used in that service. He also aided in the development of the 12-inch guns which became the forerunners of the 14-inch main batteries. He likewise pioneered in the development of smokeless powder and was instrumental in the establishment of the Naval Powder Factory at Indian Head, Md.

NOTICE ALSO HAS BEEN RECEIVED of the deaths of the following members of the Association: C. C. Albertson, Elmira, N. Y.; J. T. Boyd, New York, N. Y.; C. L. Brackett, Detroit, Mich.; J. L. Burns, Minneapolis, Minn.; L. F. Burns, Baker, Mont.; Ralph Byrne, Jr., Pasadena, Calif.; J. N. Critchlow, Easton, Md.; C. C. Davis, Detroit, Mich.; M. G. Firestone, Cleveland, Ohio; L. P. Freeman, Toledo, Ohio; F. R. Gerard, New York, N. Y.; E. S. Graham, Corpus Christi, Tex.; L. R. Hall, Thomasville, N. C.; Eben Halley, Rochester, N. Y.; H. L. Heitzman, Cleveland, Ohio; J. M. Hughes, Youngstown, Ohio; S. E. Hyman, Fremont, Ohio; L. W. Kempf, Cleveland, Ohio; W. P. Mallery, Jr., Huntsville, Tex.; L. E. May, Chicago, Ill.; Mrs. Josephine P. McKenzie, Detroit, Mich.; D. E. McKnight, East Cleveland, Ohio; R. E. McLuckie, Toledo, Ohio; A. H. Means, Los Angeles, Calif.; G. T. Phillips, Amarillo, Tex.; H. W. Potter, Toledo, Ohio; J. L. Replogle, Palm Beach, Fla.; W. A. Robinson, Gloucester, Va.; W. O. Shay, Sr., Terra Alta, W. Va.; C. L. Sullivan, Jr., Dayton, Ohio; C. H. Swift, Chicago, Ill.; L. R. Thomas, Youngstown, Ohio; A. C. Uerkwitz, Toledo, Ohio; J. R. Underwood, Tulsa, Okla.; J. E. Wagner, Alliance, Ohio; G. W. Walker, Detroit, Mich.; R. B. Watts, Williamsburg, Va.; C. G. Werscheid, Maplewood, Mo.; Harry Wickland, Philadelphia, Pa.; C. V. Williams, Dayton, Ohio; H. L. Wyatt, Danville, Va.; E. B. Yancey, Wilmington, Del. To their relatives and friends, ORDNANCE, on behalf of the Association membership, extends condolences.

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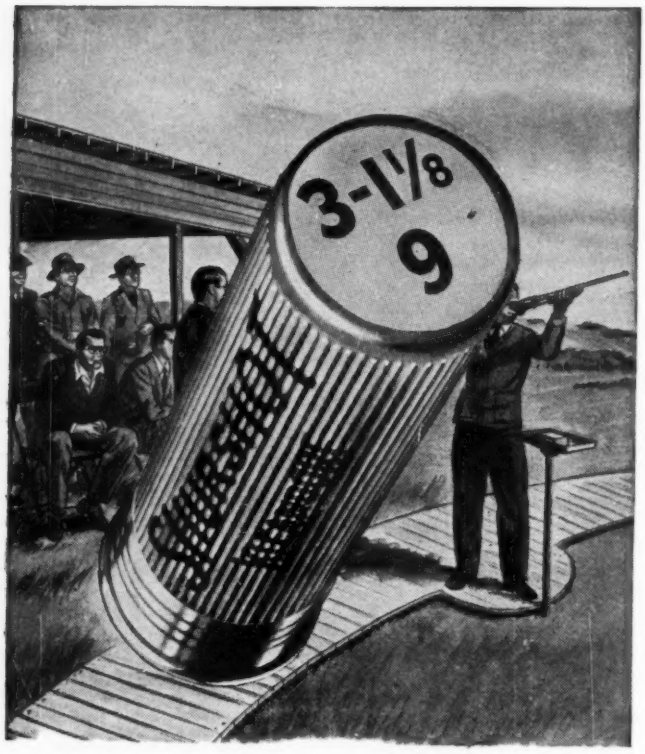

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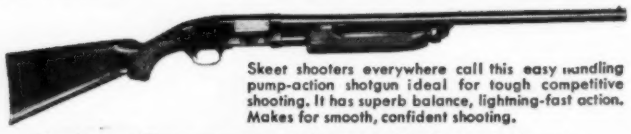

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Coral and Brass. By Gen. Holland M. Smith. New York: Charles Scribner's Sons. 289 pp. $3.

HERE is the personal story of one of the most picturesque and controversial figures of World War II—"Howlin' Mad" Smith. It is at the same time the story of the Marine Corps' brave and bloody march across the Pacific.

While he evaluates the "brass" of all the services in forthright terms, General Smith was big brass himself. An amphibious-warfare expert, he was commanding general at Tarawa, Saipan, and Iwo Jima, and eventually commander of all Marine land operations against Japan.

The major portion of the book deals with the Pacific War. Here the General really cracks down, and the chips can fall where they may. He says that Tarawa was a mistake; that time and again the Navy failed to prepare the way for invasion with sufficient bombardment; that admirals who wanted to act as generals imperiled victory in the coral islands. Of the "Saipan controversy," he says the episode has been magnified out of all proportion by interservice jealousies. The Marines themselves, it seems, could do no wrong.

But, then, Howlin' Mad Smith had been standing up for his beloved Marines ever since World War I, and he had fought constantly to win for them equal participation with other branches of the service. This was in part a battle to obtain support for the revolutionary methods of amphibious invasion worked out by the Marines before the war. How the technique of assaulting supposedly impregnable beaches was developed makes an absorbing story.—ROBERT EMSWORTH.

The German Generals Talk. By Capt. B. H. Liddell Hart. New York: William Morrow & Company. 308 pp. $4.

THIS book, an account by the noted British military analyst of interviews with captured German officers, reveals as much about the German generals' quarrels with Hitler as about their battles with the Allies. It tells how the generals were right and Hitler was wrong for campaign after campaign. For example, the generals objected to Hitler's plan which led to the Battle of

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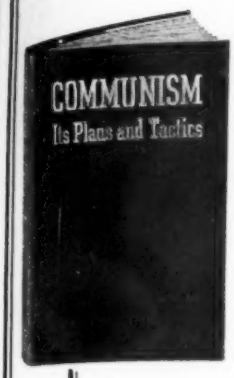
Book of the Month for MARCH



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By Edmund Love

Capt. Edmund Love, official Army historian, author of the *Saturday Evening Post* article on the 27th Division, has written an accurate, authoritative history of the 27th and its campaigns—including a long eyewitness account of the Battle of Saipan. Retail $10.00. To members $7.00.

The Second World War

By Maj. Gen. J. C. F. Fuller

J. C. F. Fuller's new, brilliant study of the history, the successes, the blunders of World War II was reviewed at length in the last issue of ORDNANCE. Hoffman Nickerson, author of a long analysis, says, "Its comments on the several campaigns of 1939-1945 might be most profitably dwelt on by both officers and civilians," and lays heavy stress on Fuller's new and critical view of strategic bombing. Retail $5.00. To members $4.50.

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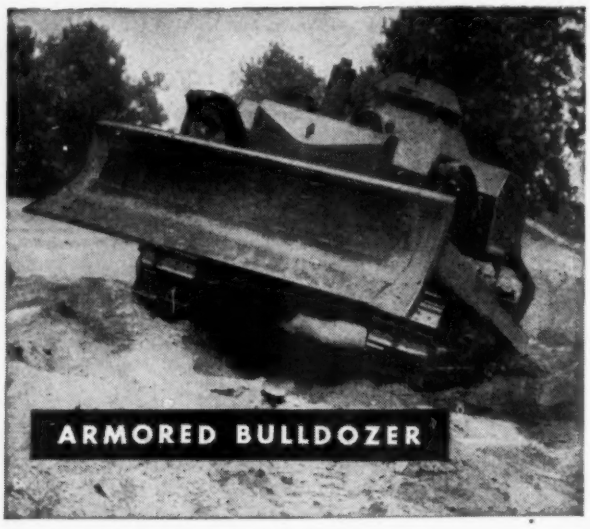

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Book Reviews

the Bulge during the winter of 1944-1945. They knew such a long-odds scheme could not succeed because they had neither the forces nor the resources to sustain such an undertaking. Rundstedt, who commanded in the West at that time, was never consulted about the attack, and Liddell Hart found him still bitter about the battle.

The generals thought Hitler a technician rather than a strategist who knew how to win a war because he always wanted to know how much and how many. They believed an elastic defense would have worn down the Russian offensive but were unable to convince Hitler. One general said: "The root cause of Germany's defeat was the way that her forces were wasted in fruitless efforts and, above all, in fruitless resistance at the wrong time and place. That was due to Hitler." However, it was noted that the generals esteemed Hitler whenever his ideas were successful and found fault with him when they were not.

The generals regarded the Russians as their most formidable enemy. They were of the opinion that the Russians had the best tanks in the world, as well as rifles which were better than German models.

The information contained in this book is as valuable to historians, if not more so, as any account of the war written by American generals. The Germans fought a long war against the most powerful armies the world has ever seen. The fact that before the book ends the author almost whitewashes the German generals, as well as the German General Staff, and gives the impression that they were victims of a war which they led does not lessen its value.—PHILIP SCHWARTZ.

Kinematics of Machines. By Arthur F. Macconochie. New York: Pitman Publishing Corporation. 217 pp. $3.

HIDDEN under a formidable title, the contents of this volume present principles of elementary mathematics and mechanics in most fascinating form. Intended as a supplemental textbook for second- and third-year students of engineering, the author here presents the fruit of many years' experience in the exposition of this subject at the University of Virginia and of his long and intimate association with the engineering professions and American industry.

In it he has succeeded in making the subject of motion of machines as fascinating to the general reader as it should be to the student of engineering. Nor has he been content to follow the beaten path. In particular, the author interprets the relativity of space and time in terms that make sense to ordinary folks like engineers and ordnance experts as distinguished from highly trained mathematicians who dwell in spheres all their own.

Professor Macconochie is well known throughout American industry and especially in the ordnance engineering field. He did yeoman work for the Army Ordnance Department throughout World War II and contributed in outstanding measure to the artillery shell production program as well as to many important phases of ordnance research and development.

He is a professor of mechanical engineering at the University of Virginia and a director of the Washington Post, American Ordnance Association. Not only by his engineering and scientific prowess but especially by his kindly qualities—Virginia gentleman that he is—he has the respect and admiration of the Ordnance fraternity.—L. A. CODD.

John J. Pershing, General of the Armies. By Frederick Palmer. Harrisburg: The Military Service Publishing Company. 380 pp. $4.50.

COLONEL PALMER could hardly be surpassed as the author of this fast-moving biography of the commander of the A.E.F. Pershing's friend for many years and dean of war correspondents, his grasp of history and the military art enables him unfail-

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Both General Pershing and his biographer point unerringly to the one guarantee of peace—an America morally and militarily strong and united. Though neither great nor full, the book is satisfying and informative.—F. W. F. GLEASON.

Science at War. By J. G. Crowther and R. Whiddington, C.B.E., F.R.S. New York: Philosophical Society. 185 pp. $6.

THIS is a detailed account of the contribution of science to the war effort, based on official archives and documents assembled by the Scientific Advisory Committee to the British Cabinet. It was written by scientists with due regard to security but sufficiently complete and detailed so as to inform the technical reader as well as the layman.

It covers the subject of radar in detail and at some length. The sections on operational research and science and the services bring out clearly many lesser known functions of science and contrast the German system of science utilization with that of the Allies. It covers the atomic bomb and the very early research in this connection.

In all the accomplishments of the Allies the superior methods of operating democracies are proved through extraordinary intimacy between deviser, user, and producer. Credit is given to the United States for a part in these accomplishments through development and production. However, the book is written by British authors, and Britain's part in the war is naturally more fully developed. This is a charming work, very instructive, and the manner of presentation, with the subtle humor of the British writer, calls for more books by similar authors.—THOMAS K. VINCENT.

The Rifle—Its Development for Big Game Hunting. By S. R. Truesdell. Harrisburg. Military Service Publishing Company. 274 pp. $5.

THE volume covers a considerably greater field than is indicated in its subtitle. Truesdell devotes his splendid introduction to the evaluation of the influence of the rifle on modern civilization and to its place in history. And throughout the book runs a generous commentary on the history of the weapon, both as a military and a civilian tool. Perhaps few of us realize the scope of civilian and military rifle shooting, both on design and development of gun and cartridge and their production in peace and war.

The author divides the body of his work into four sections. The large bores of 1834-1874; the medium bores of 1875-1892; the small bores of 1893-1905; and the high-velocity small bores of 1906-1946. In estimating the worth of the vast range of weapons which crowd the span of more than a century, Truesdell quotes from some 300 works written by the greatest hunters and riflemen of the time. His checking of these opinions (and no opinions can be more contradictory than gunners') is done with much skill and smoothness.—F. W. F. GLEASON.

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ORDNANCE

The Magazine of Scientific and Industrial Preparedness

VOL. XXXIII, No. 173 • SECTION II • MARCH-APRIL, 1949

To Keep America Strong for Peace

In this section are published the names of the officials of the American Ordnance Association—officers, members of Council, the Board of Directors, Executive Committee, and Advisory Board. Also listed here are the local Posts of the Association with their officers and directors; likewise the membership of the National Technical Divisions and Committees of the A.O.A. Section II concludes with the Honor Roll of Industrial Preparedness whereon are inscribed the names of the Company Members of the American Ordnance Association.

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Russell E. Gardner, Jr., Reinholdt & Gardner, 400 Locust Street, St. Louis, Mo.

Earl B. Gilmore, 6813 West 3rd Street, Los Angeles, Calif.

T. M. Girdler, Republic Steel Corporation, Cleveland, Ohio

A. W. Herrington, Marmon-Herrington Company, Indianapolis, Ind.

B. T. McNeil, McEvoy Company, Houston, Tex.

Thomas A. Morgan, Sperry Corporation, 30 Rockefeller Plaza, New York 20, N. Y.

John M. Olin, Olin Industries, Inc., East Alton, Ill.

S. E. Reimel, National Security Resources Board, Old State Building, Washington, D. C.

Charles H. Tenney, Springfield Gas Light Company, 35 State Street, Springfield, Mass.

Hon. James W. Wadsworth, Geneseo, New York

Charles E. Wilson, General Electric Company, 570 Lexington Avenue, New York, N. Y.

Local Posts of the A.O.A.

Local Posts of the Association are established in principal scientific, industrial, and educational centers throughout the Nation to cultivate a more intimate understanding of ordnance subjects through local meetings, plant visits, seminars, and reports on specific ordnance problems.

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President: C. F. Pickett. Vice-President: L. C. Josephs. Directors: O. G. Bennett, J. H. Frazier, G. B. Jarrett, Charles McKnight, W. M. Wiesenberg, R. P. Witt. Treasurer: J. A. Barclay. Secretary: L. W. Nederkorn, Aberdeen Proving Ground, Md.

Birmingham, December 3, 1930

President: H. P. Bigler. Vice-President: R. C. Stobert. Directors: Bradford Colcord, C. S. Lawson, R. W. Coward, M. E. Pratt, T. M. Nesbitt, Robert Gregg, R. D. Hickman, Oscar Wells, T. W. Martin. Treasurer: R. D. Cotten. Secretary: R. E. Parker, 700 Frank Nelson Building, Birmingham 3, Ala.

Central Illinois, May 29, 1945

President: J. R. Munro. Vice-President: R. L. Larson. Directors: S. S. Battles, D. A. Campbell, P. E. Herschel, Jr., Henry Howard, Theron Howard, W. A. Matheson, Emil Norelius, L. P. Weiner. Treasurer: Merle Yontz. Secretary: R. L. Hafer, Peoria Association of Commerce, Peoria, Ill.

Chicago, May 3, 1924

President: John Slezak. Vice-President: H. J. Prebensen. Directors: E. J. Bush, W. E. Crocombe, Thomas Drever, T. S. Hammond, H. P. Isham, J. W. Karraker, James Knowlson, Fowler McCormick, F. W. Parker, Jr., W. G. Swartchild, Jr., W. R. Wright. Treasurer: G. D. Dearlove. Assistant Treasurer: G. R. Catlett. Assistant Secretary: E. J. O'Keefe. Secretary: M. J. Allen, Room 1410, 400 N. Michigan Avenue, Chicago 11, Ill.

Cincinnati, December 10, 1925

President: L. W. Scott Alter. Vice-Presidents: E. R. Godfrey, R. G. Calton, H. V. Heuser, Louis Schwitzer. Directors: L. W. Scott Alter, R. H. Ferger, F. V. Geier, E. R. Godfrey, H. C. Knowles, E. A. Muller, Louis Polk, P. E. Rentschler, R. P. Rhame. Secretary-Treasurer: C. H. Wood, Big Four Building, Cincinnati 2, Ohio.

Cleveland, October 25, 1940

President: Ward M. Canaday. 1st Vice-President: J. C. McHannan. Directors: R. F. Black, F. H. Chapin, F. C. Crawford, D. S. Ellis, William Forster, B. F. Hopkins, A. D. Joyce, Frank Purnell, H. A. Roemer, G. W. Stephens, W. R. Timken, J. E. Trainer, A. J. Weatherhead, Jr., C. M. White, Clyde Williams. Secretary-Treasurer: W. A. Weaver, Griswold-Eshleman Company, Terminal Tower, Cleveland, Ohio.

Empire, April 29, 1938

President: F. J. Smith. Vice-Presidents: E. A. Halbleib, Keith Williams. Directors: G. W. Cole, C. F. Dietz, R. E. Dillon, J. E. Gleason, E. A. Halbleib, C. S. Hallauer, M. J. Hayes, F. F. Hickey, C. H. Lang, T. L. Lee, E. Norquist, H. B. Sheets, F. J. Smith, D. W. Sowers, K. Williams. Treasurer: E. R. Davenport. Acting Secretary: R. C. Hands, 1258 Sibley Tower Building, Rochester 4, N. Y.

Hartford-Springfield, November 18, 1941

President: S. C. Hope. Vice-Presidents: J. H. Chaplin, E. B. Gallaher, C. H. Granger. Directors: F. H. Payne, *chairman;* G. H. Anthony, M. K. Barroll, Jr., J. S. Begley, E. P. Bullard, J. H. Chaplin, F. U. Conard, C. K. Davis, E. B. Gallaher, W. M. Goss, C. H. Granger, S. C. Hope, L. E. Lentz, D. G. Millar, C. B. Parsons, H. H. Pease, R. E. Pritchard, E. S. Pugsley, J. Y. Scott, H. W. Steinkraus. Secretary-Treasurer: J. A. MacDonnell, Gilbert & Barker Manufacturing Company, West Springfield, Mass.

Lehigh-Bethlehem, November 15, 1939

President: Edward Leaton. Vice-President: James Schultz. Directors: M. K. Ament, L. J. Bray, Henry Leudecke, William Royer, W. O. Snelling, R. M. Webster. Secretary-Treasurer: J. J. Astringer, Taylor D, Lehigh University, Bethlehem, Pa.

Lone Star, June 12, 1945

Acting President: H. S. Zane, Jr. Directors: E. H. Brooks, G. H. Brown, S. P. Hamer, A. A. Hardy, F. L. Lebus, G. G. McDonald, Charles Medley, F. A. Pierce, H. S. Zane, Jr. Secretary-Treasurer: W. M. Harrison, 1111 Foch Street, Fort Worth, Tex.

Los Angeles, May 27, 1936

President: H. L. Clark. Vice-President: H. J. Kaiser, Jr. Directors: H. L. Clark, L. G. Dunn, H. J. Kaiser, Jr., D. A. Kimball, P. W. Lizza, W. C. Main, C. H. Nazro, K. T. Norris, M. B. Pendleton, J. B. Rauen, S. K. Rindge, A. C. Rubel, J. D. Spalding, H. C. Thomas, C. B. Tibbetts. Treasurer: S. K. Rindge. Secretary: C. H. Nazro, P. O. Box 2262 Terminal Annex, Los Angeles 54, Calif.

Massachusetts Institute of Technology, January 20, 1922

President: George Hossfeld. Vice-President: W. D. Virtue. Treasurer: M. O. Sorensen. Secretary: R. A. Grott, 487 Commonwealth Avenue, Boston, Mass.

Michigan, December 12, 1942

President: C. T. Fisher, Jr. First Vice-President: H. C. Fruehauf. Second Vice-President: S. E. Skinner. Directors: H. W. Alden, R. P. Briggs, M. E. Coyle, G. T. Christopher, J. M. Dodge, C. T. Fisher, Jr., B. M. Ford, H. C. Fruehauf, K. T. Keller, G. W. Kennedy, G. W. Mason, S. E. Skinner, S. T. Stackpole, Oscar Webber, H. J. Woodall. Secretary-Treasurer: L. R. Downie, c/o Kelsey-Hayes Wheel Corporation, 3600 North Military Avenue, Detroit, Mich.

Mid-Continent, December 12, 1944

President: Frank Hinderliter. 1st Vice-President: R. R. King. 2nd Vice-President: George Nicholson. Directors: The officers and M. H. Johnson, H. E. McCray, Walter O'Bannon, Jr., W. W. Siegrist, W. H. Stueve, Ed Warmack. Secretary-Treasurer: C. R. Horton, 8211 E. Seventh Street, Tulsa, Okla.

Midwest, May 16, 1945

President: Harry Darby. 1st Vice-President: J. C. Shepherd. 2nd Vice-President: C. M. Standiford. Directors: L. M. Alexander, Paul Froeschl, Elmer Pierson, Philip Rahm, Kenneth Spencer, E. J. Ziegler. Secretary-Treasurer: F. B. Nichols, 1921 Central Street, Kansas City 8, Mo.

Milwaukee, September 26, 1928

President: F. D. Hansen. Vice-President: N. R. Knox. Directors: F. R. Bacon, P. H. Batten, L. R. Clausen, W. W. Coleman, J. E. DeLong, H. S. Falk, G. H. Fobian, Walter Geist, F. D. Hansen, H. S. Johnson, Jr., N. R. Knox, H. V. Kohler, J. C. Merwin, R. A. Uihlein, P. J. E. Wood. Secretary-Treasurer: Jacobus Kruyne, Marshall & Ilsley Bank, 721 N. Water Street, Milwaukee 2, Wis.

Nebraska, June 22, 1944

President: Ben Hughes. Vice-President: John McCague. Directors: C. D. Ammon, Robert Bernstein, D. C. Bradford, F. H. Bucholz, Clyde Dempster, Karl Vogel. Secretary-Treasurer: F. G. Arkoosh, 802 Omaha National Bank Building, Omaha, Nebr.

New York, June 15, 1921

President: C. S. Comeaux. 1st Vice-President: J. G. Phillips. 2nd Vice-President: L. C. Stowell. 3rd Vice-President: W. A. Davidson. 4th Vice-President: N. H. Gilroy. Directors: J. L. Auer, P. R. Bassett, C. W. Keuffel, R. L. Maxwell, P. B. Scott. Treasurer: H. T. Luria. Secretary: D. B. MacMaster, 111 East 16th Street, New York, N. Y.

Northwest, March 15, 1945

President: W. C. MacFarlane. Vice-Presidents: Harold Sweatt, Charles Horn. Directors: A. P. Baston, Fred Blumers, P. G. Bourne, C. E. Buckbee, R. P. Carlton, C. L. Horn, W. F. Kasper, L. S. Oakes, D. W. Onan, G. H. Rozum, W. G. Seeger, D. A. Smith, A. V. Stallard, H. A. Washburn, A. M. Wilson, F. B. Winston, Brison Wood. Secretary-Treasurer: R. F. Wilson, Palace Building, Minneapolis 1, Minn.

Philadelphia, December 9, 1926

President: W. J. Meinel. Vice-Presidents: G. W. Elliott, D. N. Hauseman, C. J. Ingersoll, T. D. Barney. Directors: G. M. Barnes, E. G. Budd, Jr., G. W. Elliott, H. W. Gadsden, H. P. Gant, A. W. Gilmer, C. H. Godschall, D. N. Hauseman, L. E. Hess, C. J. Ingersoll, Ralph Kelly, E. J. Langham, W. J. Meinel, R. P. Page, Jr., W. C. Pew, C. S. Redding, Wilbert Wear. Secretary-Treasurer: W. F. Feustel, Bldg. 11, Frankford Arsenal, Philadelphia 37, Pa.

Pittsburgh, February 24, 1927

President: H. C. Minton. Vice-President: J. K. B. Hare, T. E. Millsop. Directors: The officers and F. B. Bell, R. C. Downie, W. K. Fitch, H. A. Gidney, L. Iversen, A. E. Walker, I. E. Wilson. Treasurer: T. H. Eddy. Secretary: W. S. Rial, Jr., 1312 Highland Building, Pittsburgh, Pa.

Puget Sound, January 25, 1944

President: H. P. Lawrence. 1st Vice-President: Robert Nelson. 2nd Vice-President: John Cannon. Directors: Frank Berry, L. B. Cooper, J. A. Denn, Watt Fallis, Alexander Finlayson, Henry Isaacson, George Lamb, F. B. Lee, A. F. Parker, W. F. Schiesel, F. W. Schmidt, Ferdinand Schmitz, Walter Toly, R. O. Welch. Secretary-Treasurer: C. W. Huffine, 414 White Building, Seattle 1, Wash.

Quad Cities-Iowa, May 28, 1945

President: T. E. Stahl. Vice-President: E. W. Ross. Directors: Frank Anderson, R. E. Choate, J. H. Diedrich, L. M. Gildea, Henry Lord, K. E. Madden, Fred Maytag, II, C. R. Sheaffer, George Uhlmeyer, C. A. Waldmann, G. L. Weissenburger, C. D. Wiman. Secretary-Treasurer: Donald Meyers, Rock Island Arsenal, Rock Island, Ill.

Rocky Mountain, June 10, 1942

President: W. M. Reno. Vice-President: James Colasanti. Directors: A. W. Ainsworth, J. L. Brown, C. C. Drake, F. R. Eberhardt, B. C. Essig, J. K. Garretson, J. G. Gates, R. P. Gutshall, J. D. Maitland, M. M. Millsap, N. H. Orr, G. A. Sabin, S. C. Shubert, H. F. Silver, T. C. Timpte, J. R. Travis, C. W. Webb, A. D. Weiss. Secretary-Treasurer: W. E. Lipsey, 1108 Fifteenth Street, Denver, Colo.

St. Louis, January 18, 1927

President: E. B. Meissner. Vice-President: C. H. Morgan. Directors: W. M. Akin, A. A. Busch, Jr., J. D. Childs, A. G. Drefs, A. W. Frazier, R. E. Gardner, Jr., E. F. Judge, R. P. Kauffman, E. C. Kiel, Hayward Niedringhaus, S. T. Olin, W. M. Rand, G. A. Waters, C. P. Whitehead. Treasurer: M. F. Hubbell. Secretary: Wallace Morse, 4800 Goodfellow Boulevard, St. Louis 20, Mo.

San Francisco, October 17, 1923

President: R. M. Alvord. Vice-Presidents: Estey Julian, E. E. Trefethen. Directors: Starr Bruce, R. C. Force, K. B. Harmon, Charles Kendrick, Charles Moore, W. A. Starr, Carl Wente, C. S. Wheeler, Jr., Dean Witter. Secretary-Treasurer: R. L. Bidwell, c/o San Francisco Ordnance District, Oakland Army Base, Oakland 14, Calif.

Texas, October 30, 1942

President: F. M. Wirtlinger. Vice-President: Herman Brien. Directors: W. O. Hedrick, E. D. Konken, D. J. Martin, L. B. Ryon, R. H. Startzell, Ross Stewart. Secretary-Treasurer: L. S Bassett, P. O. Box 2545, Houston 1, Tex.

University of Michigan, February 20, 1941

President: L. H. T. Dehmlow. Vice-President: W. C. Zabrosky. Corresponding Secretary: W. DesJardins. Recording Secretary-Treasurer: T. J. Miller, 3899 Doremus Avenue, Hamtramck 12, Mich.

Washington, November 18, 1925

President: F. W. Foster Gleason. Vice-Presidents: Philip Schwartz, A. W. Mace. Advisory Board: H. P. Erwin, C. T. Harris, W. G. Lockwood, Frank Macconochie, Earl McFarland, C. M. Wesson, F. E. Wright. Directors: H. T. Bodman, W. F. Byrne, R. C. Coupland, M. H. Davis, R. L. Eichberg, A. H. Ferrandou, T. G. Gentel, S. G. Green, F. J. Jervey, C. E. Meissner, H. H. Mitchell, A. A. White, R. P. Williams. Secretary-Treasurer: H. J. Crager, 610 H Street, N. E., Washington 2, D. C.

Yankee, June 30, 1925

President: F. L. Felton. 1st Vice-President: L. J. Meyns. 2nd Vice-President: H. W. Bagnall. 3rd Vice-President: F. W. Knauth. Directors: C. F. Carlstrom, H. S. Chafee, J. S. Crawford, R. F. Gow, R. N. Greenwood, R. M. Hudson, J. L. Martin, R. S. Morse, J. P. Spang, Jr., G. W. Sweet, T. H. West, R. F. Williams. Secretary-Treasurer: G. P. Slade, Army Base, Boston 10, Mass.

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The Divisions and Committees of the Association coöperate actively with industry and the Government in the solution of problems of design, production, procurement, and maintenance of the weapons and other devices needed for the national defense.

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Bomb Committee: Robert C. Enos, Standard Steel Spring Company, Coraopolis, Pa., *chairman;* J. T. Brown, J. I. Case Company, Racine, Wis.; D. M. Horner, Harrisburg Steel Corporation, Harrisburg, Pa.; F. C. Fantz, Midwest Piping & Supply Company, St. Louis, Mo.; L. W. Browne, Darby Corporation, Kansas City, Kans.; B. B. Culver, Jr., Wrought Iron Range Company, St. Louis, Mo.; H. Brock, A. O. Smith Corporation, Milwaukee, Wis.; John Parsons, Parsons Company, Traverse City, Mich.; D. L. Fletcher, National Tube Company, McKeesport, Pa.; Gordon Colby, Central Can Company, Chicago, Ill.; N. L. Etten, Chamberlain Corporation, Waterloo, Iowa; A. V. Murray, Scaife Company, Oakmont, Pa.; R. Furrer, American Car and Foundry Company, New York, N. Y.

Cartridge Case Committee: K. T. Norris, Norris Stamping and Manufacturing Company, Los Angeles, Calif., *chairman;* T. H. Chamberlain, Waterbury Manufacturing Division, Chase Brass & Copper Company, Waterbury, Conn.; W. L. Chandler, Fulton Sylphon Company, Knoxville, Tenn.; W. E. Curran, Rheem Manufacturing Company, New York, N. Y.; Weber deVore, Heintz Manufacturing Company, Philadelphia, Pa.; William J. Gazey, Ekco Products Company, Chicago, Ill.; Frank German, Washington, D. C.; H. M. Heckathorn, Mullins Manufacturing Corp., Salem, Ohio; A. C. Kieckhafer, West Bend Aluminum Company, West Bend, Wis.; W. H. Miller, Bossert Company, Utica, N. Y.; C. L. Patterson, Electric Auto-Lite Company, Cincinnati, Ohio; N. H. Preble, Detroit Harvester Company, Detroit, Mich.; M. L. Sperry, Jr., Scovill Manufacturing Company, Waterbury, Conn.; H. W. Steinkraus, Bridgeport Brass Company, Bridgeport, Conn.; H. B. Stoner, Stoner Manufacturing Corporation, Aurora, Ill.; J. A. Watson, Motor Wheel Corporation, Lansing, Mich.

Material Subcommittee: Dr. Anson Hayes, American Rolling Mill Company, Middletown, Ohio; Kirby F. Thornton, Aluminum Company of America, Westmoreland, Pa.; H. C. Larson, Bethlehem Steel Company, Bethlehem, Pa.

Technical Subcommittee: Harry M. Day, Ekco Products Company, Chicago, Ill.; E. M. Wagner, San Marino, Calif.

Container Committee: Gerard W. Mulder, Cleveland Container Company, Cleveland, Ohio, *chairman;* J. F. Griswold, Jr., Chicago Mill & Lumber Company, Chicago, Ill.; H. Holbrook, Standard Cap & Seal Company, New York, N. Y.; H. Y. Hooper, Hooper Byrne Company, New York, N. Y.; William Mayers, Industrial Tape Corporation, New Brunswick, N. J.; John Wiebers, American Can Company, Chicago, Ill.

Fuze Committee: J. E. Burke, Stewart-Warner Corporation, Chicago, Ill., *chairman;* T. C. Smith, Frederick Hart & Company, Poughkeepsie, N. Y., *deputy chairman;* E. A. Ash, F. L. Jacobs Company, Detroit, Mich.; C. A. Burnett, Scovill Manufacturing Company, Waterbury, Conn.; George Ensign, Elgin National Watch Company, Elgin, Ill.; W. F. Errig, Peco Manufacturing Corporation, Philadelphia, Pa.; W. M. Ewart, Carter Carburetor Corporation, St. Louis, Mo.; T. B. Gibbs, Gibbs Manufacturing & Research Corporation, Janesville, Wis.; P. J. Hawthorne, General Time Instruments Corporation, New York, N. Y.; R. K. McClintock, Sylvania Electric Products, Inc., Emporium, Pa.; John O'Shea, Thomas A. Edison, Inc., West Orange, N. J.; F. M. Powell, Eastman Kodak Company, Rochester, N. Y.; Carl Schlesinger, Pollak Engineering & Manufacturing Corporation, Newark, N. J.; M. L. Sperry, Jr., Scovill Manufacturing Company, Waterbury, Conn.; C. G. Troxler, Hoover Company, North Canton, Ohio.

Loading Committee: M. P. Woodward, Procter & Gamble Company, Cincinnati, Ohio, *chairman;* C. B. Burnett, Johns-Manville Products Corporation, New York, N. Y.; B. B. Bond, Remington Rand, Inc., Stamford, Conn.; Harold R. Child, Goodyear Tire & Rubber Company, Akron, Ohio; Harold C. Hoch, Goodyear Tire & Rubber Company, Akron, Ohio *(alternate);* J. A. Kelly, Todd & Brown, Inc., New York, N. Y.; L. M. Freeman, B. F. Goodrich Company, Akron, Ohio; R. W. Johnson, American Swiss Company, Toledo, Ohio.

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GORTON MACHINE COMPANY, GEORGE . . . RACINE
GOSS PRINTING PRESS COMPANY . . . . CHICAGO
GRAMM TRAILER CORPORATION . . . . DELPHOS
GRANITE CITY STEEL COMPANY . . GRANITE CITY
GREAT LAKES SPRING CORPORATION . . . CHICAGO
GREAT LAKES STEEL CORPORATION . . . ECORSE
GREBLER MANUFACTURING COMPANY . . CLEVELAND
GREDE FOUNDRIES, INC. . . . . MILWAUKEE
GREENE MANUFACTURING COMPANY . . . RACINE
GREENFIELD TAP AND DIE CORPORATION . GREENFIELD
GREIST MANUFACTURING COMPANY . . NEW HAVEN
GRIMES COMPANY, BRADLEY E. . . . WEST COLLINGSWOOD HEIGHTS
GULF OIL CORPORATION . . . . . PITTSBURGH
GUNDLACH MANUFACTURING CORPORATION FAIRPORT

H & B AMERICAN MACHINE COMPANY . . PAWTUCKET
HAINES GAUGE COMPANY . . . . PHILADELPHIA
HAMILTON WATCH COMPANY . . . . LANCASTER
HANDY AND HARMON . . . . . NEW YORK
HANLON & GOODMAN COMPANY . . . BELLEVILLE
HANLON & WILSON COMPANY . . . . PITTSBURGH
HANNIFIN CORPORATION . . . . . CHICAGO
HARNISCHFEGER CORPORATION . . . MILWAUKEE
HARRINGTON & RICHARDSON ARMS COMPANY . . . . . WORCESTER
HARRINGTON-WILSON-BROWN COMPANY . NEW YORK
HARRISBURG STEEL CORPORATION . . . HARRISBURG
HARRIS-SEYBOLD COMPANY . . . . CLEVELAND
HARSHAW CHEMICAL COMPANY . . . CLEVELAND
HARVEY MACHINE COMPANY . . . . TORRANCE
HAYES, INC., C. I. . . . . PROVIDENCE
HAYS MANUFACTURING COMPANY . . . . ERIE
HEBARD & COMPANY, W. F. . . . . CHICAGO
HEIL COMPANY . . . . . MILWAUKEE
HEINEMANN ELECTRIC COMPANY . . . . TRENTON
HEINTZ MANUFACTURING COMPANY . PHILADELPHIA
HELTZEL STEEL FORM & IRON COMPANY . . WARREN
HENDEY MACHINE COMPANY . . . . TORRINGTON
HENDRICK MANUFACTURING COMPANY CARBONDALE
HENRY & WRIGHT MANUFACTURING COMPANY . . . . . HARTFORD
HEPPENSTALL COMPANY . . . . . PITTSBURGH
HERCULES BODY COMPANY . . . . . EVANSVILLE
HERCULES MOTORS CORPORATION . . . . CANTON
HERCULES POWDER COMPANY . . . . WILMINGTON
HERCULES STEEL PRODUCTS CORPORATION . GALION
HESSE MACHINE & MANUFACTURING COMPANY BOSTON
HEYDEN CHEMICAL CORPORATION . . . NEW YORK
HIGH SPEED HAMMER COMPANY . . . ROCHESTER
HOBART MANUFACTURING COMPANY . . . . TROY
HOE & COMPANY, R. . . . . NEW YORK
HOFMANN & COMPANY, ALFRED . WEST NEW YORK
HOLCOMB & HOKE MANUFACTURING COMPANY . . . . . INDIANAPOLIS
HOLLINGSHEAD CORPORATION, R. M. . . . CAMDEN
HOOSAC MILLS CORPORATION . . . . . BOSTON
HOOVER COMPANY . . . . . NORTH CANTON
HORROCKS-IBBOTSON COMPANY . . . . UTICA
HOUGHTON & COMPANY, E. F. . . . PHILADELPHIA
HOWELL COMPANY . . . . . ST. CHARLES

Honor Roll of Industrial Preparedness

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HUDSON MOTOR CAR COMPANY . . DETROIT
HUGHES AIRCRAFT COMPANY . . . . CULVER CITY
HUGHES TOOL COMPANY . . . . . HOUSTON
HUNTER CORPORATION, E. V. . . . . STOWE
HUPP CORPORATION . . . . . DETROIT
HUTCHENS METAL PRODUCTS, INC. . SPRINGFIELD
HYATT BEARINGS DIVISION, GMC . . . HARRISON
HYDRO MANUFACTURING COMPANY . . . DETROIT

INDIANA LIMESTONE COMPANY . . . . BEDFORD
INDUSTRIAL RUBBER GOODS COMPANY . ST. JOSEPH
INLAND MANUFACTURING DIVISION, GMC . . DAYTON
INLAND STEEL COMPANY . . . . . CHICAGO
INTERCHEMICAL CORPORATION . . . NEW YORK
INTERNATIONAL BUSINESS MACHINES CORPORATION . . . . . NEW YORK
INTERNATIONAL CHAIN & MANUFACTURING COMPANY . . . . . YORK
INTERNATIONAL DETROLA CORPORATION . . DETROIT
INTERNATIONAL HARVESTER COMPANY . . CHICAGO
INTERNATIONAL NICKEL COMPANY . HUNTINGTON
INTERNATIONAL SILVER COMPANY . . . . MERIDEN
IONIA MANUFACTURING COMPANY . . . . IONIA
ITHACA GUN COMPANY . . . . . ITHACA

JACKSON AND CHURCH COMPANY . . . . SAGINAW
JACKSON INDUSTRIES, INC. . . . . BIRMINGHAM
JACKSONVILLE METAL MANUFACTURING COMPANY . . . . . JACKSONVILLE
JACOBS COMPANY, F. L. . . . . DETROIT
JIG BUSHING COMPANY . . . . . PONTIAC
JOA, INC., CURT G. . . . . SHEBOYGAN
JOHNS-MANVILLE SALES CORPORATION . NEW YORK
JOHNSON AUTOMATICS, INC. . . . . BOSTON
JONES & LAMSON MACHINE COMPANY . SPRINGFIELD
JONES & LAUGHLIN STEEL CORPORATION . PITTSBURGH

KAISER-FRAZER CORPORATION . . . WILLOW RUN
KAYDON ENGINEERING CORPORATION . . MUSKEGON
KEARNEY & TRECKER CORPORATION . . WEST ALLIS
KELLOGG COMPANY, M. W. . . . . NEW YORK
KELLY-SPRINGFIELD TIRE COMPANY . CUMBERLAND
KELSEY-HAYES WHEEL COMPANY . . . . DETROIT
KENNAMETAL, INC. . . . . LATROBE
KENNEDY-VAN SAUN MANUFACTURING & ENGINEERING COMPANY . . . . . DANVILLE
KENWORTH MOTOR TRUCK CORPORATION . . SEATTLE
KEUFFEL & ESSER COMPANY . . . . HOBOKEN
KEYSTONE MANUFACTURING COMPANY . . BOSTON
KIDDE & COMPANY, WALTER . . . . BELLEVILLE
KIFFER TOOL AND DIE, INCORPORATED . CLEVELAND
KILGORE MANUFACTURING COMPANY . WESTERVILLE
KING-SEELEY CORPORATION . . . . ANN ARBOR
KINGSBURY MACHINE TOOL CORPORATION . KEENE
KNAPP-MONARCH COMPANY . . . . ST. LOUIS
KOEHRING COMPANY . . . . . MILWAUKEE
KOHLER COMPANY . . . . . KOHLER
KOPPERS COMPANY . . . . . PITTSBURGH

LAKE CITY MALLEABLE IRON COMPANY . CLEVELAND
LANOVA CORPORATION . . . . LONG ISLAND CITY
LANSDOWNE STEEL & IRON COMPANY . . . MORTON
LAPOINTE MACHINE TOOL COMPANY . . . HUDSON
LARGE LUMBER COMPANY, FRED R. . . ROCHESTER
LEBANON STEEL FOUNDRY . . . . . LEBANON
LEE TIRE & RUBBER COMPANY OF NEW YORK, INC. . . . . CONSHOHOCKEN
LEEDS & NORTHRUP COMPANY . . . PHILADELPHIA
LEHIGH FOUNDRIES, INC. . . . . EASTON
LIEBERKNECHT, INC., KARL . . . . . READING
LIMA-HAMILTON CORPORATION . . . . LIMA
LINCOLN BRASS WORKS, INC. . . . . DETROIT
LINCOLN ELECTRIC COMPANY . . . . CLEVELAND
LINCOLN ENGINEERING COMPANY . . . ST. LOUIS
LINE MATERIAL COMPANY . . . . . MILWAUKEE
LINK-BELT COMPANY . . . . . CHICAGO
LUKENS STEEL COMPANY . . . . COATESVILLE
LYNCHBURG FOUNDRY COMPANY . . . LYNCHBURG

MACK MANUFACTURING CORPORATION . NEW YORK
MADDOX FOUNDRY & MACHINE WORKS, INC. . ARCHER
MANSFIELD TIRE & RUBBER COMPANY . . MANSFIELD
MARLIN-ROCKWELL CORPORATION . . . JAMESTOWN
MARMON-HERRINGTON COMPANY . . INDIANAPOLIS
MASLAND & SONS, C. H. . . . . CARLISLE
MASON & HANGER COMPANY . . . . NEW YORK
MATHEWS CONVEYOR COMPANY . . ELLWOOD CITY
MAXSON CORPORATION, W. L. . . . . NEW YORK
MCCAULEY METAL PRODUCTS, INC. . . . BUFFALO
MCCONWAY & TORLEY CORPORATION . . PITTSBURGH
MCDOWELL MANUFACTURING COMPANY . PITTSBURGH
MCINERNEY SPRING & WIRE COMPANY GRAND RAPIDS
MCKAY COMPANY . . . . . PITTSBURGH
MCKINNEY & SON, INC., JAMES . . . . ALBANY
MCQUAY-NORRIS MANUFACTURING COMPANY ST. LOUIS
MECHANICAL HANDLING SYSTEMS, INC. . . DETROIT
MELCHOIR, ARMSTRONG, DESSAU COMPANY OF DELAWARE, INC. . . . . RIDGEFIELD
MERCK & COMPANY . . . . . RAHWAY
MERGENTHALER LINOTYPE COMPANY . . BROOKLYN
MERZ ENGINEERING COMPANY . . . INDIANAPOLIS
METAL PRODUCTS CORPORATION . . . . MIAMI
METROLOY CORPORATION . . . . NEW ROCHELLE
MEYER MANUFACTURING COMPANY, GEO. J. . . . . CUDAHY
MICA INSULATOR COMPANY . . . . NEW YORK
MICHIGAN STEEL CASTING COMPANY . . . DETROIT
MIDVALE COMPANY . . . . . PHILADELPHIA
MIDWEST PIPING AND SUPPLY COMPANY . ST. LOUIS
MILCO UNDERGARMENT COMPANY . . BLOOMSBURG
MILLER ELECTRIC COMPANY . . . JACKSONVILLE
MILLER MANUFACTURING COMPANY . . . DETROIT
MILLER PRINTING MACHINERY COMPANY . PITTSBURGH
MILSCO MANUFACTURING COMPANY . . MILWAUKEE
MINES EQUIPMENT COMPANY . . ST. LOUIS
MINNEAPOLIS-HONEYWELL REGULATOR COMPANY . . . . . MINNEAPOLIS

Honor Roll of Industrial Preparedness

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MINNEAPOLIS-MOLINE POWER IMPLEMENT COMPANY . . . . . MINNEAPOLIS
MISSISSIPPI RIVER FUEL CORPORATION . ST. LOUIS
MONARCH ALUMINUM MFG. COMPANY . . CLEVELAND
MONARCH RUBBER COMPANY . . . HARTVILLE
MONITOR CONTROLLER COMPANY . . . BOSTON
MONROE AUTO EQUIPMENT COMPANY . . . MONROE
MONROE CALCULATING MACHINE COMPANY . ORANGE
MONTGOMERY ELEVATOR COMPANY . . . MOLINE
MONTPELIER MANUFACTURING COMPANY . MONTPELIER
MOORE DROP FORGING COMPANY . . . SPRINGFIELD
MOORE ENAMELING & MANUFACTURING COMPANY . . . . . WEST LAFAYETTE
MOREY MACHINERY COMPANY . . . . NEW YORK
MORRISON STEEL PRODUCTS, INC. . . . . BUFFALO
MOSLER SAFE COMPANY . . . . . HAMILTON
MOTO-MOWER COMPANY . . . . . DETROIT
MOTOR WHEEL CORPORATION . . . . . LANSING
MULLINS MANUFACTURING CORPORATION . . SALEM
MUNCIE GEAR WORKS, INC. . . . . MUNCIE
MUNSINGWEAR, INC. . . . . MINNEAPOLIS
MURRAY MANUFACTURING COMPANY . . . WAUSAU
MURRAY OHIO MANUFACTURING COMPANY CLEVELAND

NAGEL-CHASE MANUFACTURING COMPANY . CHICAGO
NARROW FABRIC COMPANY . . . . . READING
NASH ENGINEERING COMPANY . . SOUTH NORWALK
NASH-KELVINATOR CORPORATION . . . . DETROIT
NASHUA GUMMED AND COATED PAPER COMPANY NASHUA
NATIONAL ACME COMPANY . . . . . CLEVELAND
NATIONAL ASSOCIATION OF INSURANCE AGENTS . . . . . NEW YORK
NATIONAL AUTOMOTIVE FIBRES, INC. . . . DETROIT
NATIONAL BROACH & MACHINE COMPANY . . DETROIT
NATIONAL CASH REGISTER COMPANY . . . DAYTON
NATIONAL ENAMELING & STAMPING COMPANY . . . . . MILWAUKEE
NATIONAL LOCK WASHER COMPANY . . . NEWARK
NATIONAL MACHINERY COMPANY . . . . TIFFIN
NATIONAL MALLEABLE & STEEL CASTINGS COMPANY . . . . . CLEVELAND
NATIONAL PNEUMATIC COMPANY . . . . RAHWAY
NATIONAL POWDER COMPANY . . . . . ELDRED
NATIONAL SCREW & MANUFACTURING COMPANY . . . . . CLEVELAND
NATIONAL SLUG REJECTORS, INC. . . . ST. LOUIS
NATIONAL STAMPING & ELECTRIC WORKS . . CHICAGO
NATIONAL SUPPLY COMPANY . . . . PITTSBURGH
NATIONAL TUBE COMPANY . . . . . PITTSBURGH
NELSON SPECIALTY WELDING EQUIPMENT CORPORATION . . . . . SAN LEANDRO
NEW BRITAIN MACHINE COMPANY . . NEW BRITAIN
NEW ENGLAND BOX COMPANY . . . . GREENFIELD
NEW ENGLAND BRASS COMPANY . . . TAUNTON
NEW PROCESS GEAR CORPORATION . . SYRACUSE
NEW YORK AIR BRAKE COMPANY . . . NEW YORK
NEWARK STOVE COMPANY . . . . NEWARK
NIEDRINGHAUS METAL PRODUCTS COMPANY . . . . . ST. LOUIS
NINETEEN HUNDRED CORPORATION . . ST. JOSEPH
NOLL EQUIPMENT COMPANY . . . . CLEVELAND
NORDBERG MANUFACTURING COMPANY . MILWAUKEE
NORQUIST PRODUCTS, INC. . . . . JAMESTOWN
NORRIS STAMPING & MANUFACTURING COMPANY . . . . . LOS ANGELES
NORTHWEST AUTOMATIC PRODUCTS CORPORATION . . . . . MINNEAPOLIS
NORTON COMPANY . . . . . WORCESTER

OAKITE PRODUCTS, INC. . . . . NEW YORK
OCEAN CITY MANUFACTURING COMPANY PHILADELPHIA
OHIO FALLS DYE & FINISHING WORKS . . LOUISVILLE
OHIO RUBBER COMPANY . . . . WILLOUGHBY
OHIO STEEL FOUNDRY COMPANY . . . . LIMA
OILGEAR COMPANY . . . . . MILWAUKEE
O'KEEFE & MERRITT COMPANY . . . LOS ANGELES
OLD TRAIL MOTORS, INC. . . . . WASHINGTON
OLDSMOBILE DIVISION, GMC . . . . . LANSING
OLIN INDUSTRIES, INC. . . . . EAST ALTON
OLIVER CORPORATION . . . . . CHICAGO
OLIVER IRON AND STEEL CORPORATION . PITTSBURGH
OLSON MANUFACTURING COMPANY . . . BOISE
ONONDAGA POTTERY COMPANY . . . SYRACUSE
OPW CORPORATION . . . . . CINCINNATI
ORLEANS MATERIALS & EQUIPMENT COMPANY . . . . . NEW ORLEANS
OTIS ELEVATOR COMPANY . . . . . NEW YORK
OVERLY MANUFACTURING COMPANY . . GREENSBURG
OWENS-ILLINOIS GLASS COMPANY . . . . TOLEDO

PACIFIC CAR AND FOUNDRY COMPANY . . RENTON
PACKARD MOTOR CAR COMPANY . . . . DETROIT
PARISH PRESSED STEEL COMPANY . . . . READING
PARKER RUST-PROOF COMPANY . . . . DETROIT
PARR PAINT & COLOR COMPANY . . . CLEVELAND
PASS & SEYMOUR, INC. . . . . SYRACUSE
PECO MANUFACTURING CORPORATION . PHILADELPHIA
PEMCO CORPORATION . . . . . BALTIMORE
PENNSYLVANIA TRANSFORMER COMPANY . PITTSBURGH
PERFEX CORPORATION . . . . . MILWAUKEE
PFIZER & COMPANY, CHARLES . . . . NEW YORK
PHELPS DODGE COPPER PRODUCTS CORPORATION . . . . . NEW YORK
PHEOLL MANUFACTURING COMPANY . . . CHICAGO
PITTSBURGH FORGINGS COMPANY . . . CORAOPOLIS
PITTSBURGH STEEL COMPANY . . . . PITTSBURGH
PLUMB, INC., FAYETTE R. . . . . PHILADELPHIA
PLUME & ATWOOD MANUFACTURING COMPANY . . . . . WATERBURY
PLYMOUTH MOTOR CORPORATION . . . . DETROIT
POLORON PRODUCTS, INC. . . . . NEW ROCHELLE
PONTIAC MOTOR DIVISION, GMC . . . . PONTIAC
PONTIAC VARNISH COMPANY . . . . . PONTIAC
POPPER, INC., J. S. . . . . UNION CITY
PORTER COMPANY, H. K. . . . . PITTSBURGH
PRECISION CASTINGS COMPANY . . . SYRACUSE
PRENTISS WABERS PRODUCTS COMPANY . . . . . WISCONSIN RAPIDS

Honor Roll of Industrial Preparedness

S

PRESSED STEEL CAR COMPANY . . . . PITTSBURGH
PROCTER & GAMBLE COMPANY . . . . CINCINNATI
PULLMAN-STANDARD CAR MANUFACTURING COMPANY . . . . . CHICAGO

QUALITY GASKET & MANUFACTURING COMPANY . . . . . DETROIT

RATHBORNE HAIR & RIDGWAY COMPANY . . CHICAGO
RAYNER LITHOGRAPHING COMPANY . . . CHICAGO
RCA VICTOR DIVISION, RADIO CORP. OF AMERICA . . . . . CAMDEN
READING BATTERIES, INC. . . . . READING
REEVES BROTHERS, INC. . . . . NEW YORK
REEVES INSTRUMENT CORPORATION . . NEW YORK
REGINA CORPORATION . . . . . RAHWAY
REMINGTON ARMS COMPANY . . . . BRIDGEPORT
REMINGTON RAND, INC. . . . . STAMFORD
REO MOTORS, INC. . . . . LANSING
REPUBLIC STAMPING & ENAMELING COMPANY . . . . . CANTON
REPUBLIC STEEL CORPORATION . . . CLEVELAND
REVERE COPPER & BRASS, INC. . . . NEW YORK
REYNOLDS METALS COMPANY . . . . RICHMOND
REYNOLDS SPRING COMPANY . . . . JACKSON
RHEEM MANUFACTURING COMPANY . . NEW YORK
RICHMOND ENGINEERING COMPANY . . RICHMOND
ROBBINS ENGINEERING COMPANY . . . . DETROIT
ROBERTSHAW-FULTON CONTROLS COMPANY . . . . . GREENSBURG
ROCKWOOD SPRINKLER COMPANY OF MASSACHUSETTS . . . . . WORCESTER
ROPER CORPORATION, GEO. D. . . . . ROCKFORD
ROSS GEAR AND TOOL COMPANY . . . LAFAYETTE
ROSS-MEEHAN FOUNDRIES . . . . CHATTANOOGA
ROYAL TYPEWRITER COMPANY . . . . HARTFORD
RUDEL MACHINERY COMPANY . . . . NEW YORK
RUSSELL MANUFACTURING COMPANY . . MIDDLETON
RUSTLESS IRON & STEEL DIVISION, ARMCO STEEL CORPORATION . . . . . BALTIMORE

SAE STEELS . . . . . CLEVELAND
SAFRAN PRINTING COMPANY . . . . . DETROIT
SAGINAW MALLEABLE IRON DIVISION, GMC SAGINAW
SAGINAW STEERING GEAR DIVISION, GMC . SAGINAW
ST. LOUIS CAR COMPANY . . . . . ST. LOUIS
SALEM ENGINEERING COMPANY . . . . SALEM
SANDERSON & PORTER . . . . . NEW YORK
SANDPAPER INCORPORATED . . . . ROCKLAND
SAVAGE ARMS CORPORATION . . . . . UTICA
SCAIFE COMPANY . . . . . OAKMONT
SCHLAGE LOCK COMPANY . . . . SAN FRANCISCO
SCHLEGEL MANUFACTURING COMPANY . ROCHESTER
SCHLITZ BREWING COMPANY, JOSEPH . . MILWAUKEE
SCHLUETER MANUFACTURING COMPANY . ST. LOUIS
SCHWITZER-CUMMINS COMPANY . . INDIANAPOLIS
SCOVILL MANUFACTURING COMPANY . . WATERBURY
SCULLIN STEEL COMPANY . . . . . ST. LOUIS
SEEGER REFRIGERATOR COMPANY . . . . ST. PAUL
SELMER, INC., H. & A. . . . . NEW CASTLE
SERVEL, INC. . . . . EVANSVILLE
SERVO CORPORATION OF AMERICA . . LINDENHURST
SEYMOUR PRODUCTS COMPANY . . . . SEYMOUR
SHEAFFER PEN COMPANY, W. A. . . FORT MADISON
SHEFFIELD CORPORATION . . . . . DAYTON
SHELL OIL COMPANY . . . . . DETROIT
SHERWIN-WILLIAMS COMPANY . . . . CLEVELAND
SILAS MASON COMPANY . . . . . SHREVEPORT
SILENT GLOW OIL BURNER CORPORATION . HARTFORD
SIMMONS COMPANY . . . . . NEW YORK
SIMONDS SAW & STEEL COMPANY . . . FITCHBURG
SIMPLEX MANUFACTURING CORPORATION NEW ORLEANS
SINGER MANUFACTURING COMPANY . ELIZABETHPORT
SIVYER STEEL CASTING COMPANY . . . MILWAUKEE
SKF INDUSTRIES, INC. . . . . PHILADELPHIA
SMIT & COMPANY, ANTON . . . . . NEW YORK
SMITH CORPORATION, A. O. . . . . MILWAUKEE
SMITH, DRUM & COMPANY . . . . PHILADELPHIA
SMITH & WESSON, INC. . . . . SPRINGFIELD
SMITH MANUFACTURING COMPANY, F. A. . ROCHESTER
SNYDER MANUFACTURING COMPANY, H. P. LITTLE FALLS
SORENG MANUFACTURING CORPORATION . . CHICAGO
SOSS MANUFACTURING COMPANY . . . . DETROIT
SOUTH CHESTER TUBE COMPANY . . . . CHESTER
SOUTHERN COACH MANUFACTURING COMPANY . . . . . EVERGREEN
SPEED-O-PRINT CORPORATION . . . . . CHICAGO
SPENCER CHEMICAL COMPANY . . . KANSAS CITY
SPERRY GYROSCOPE COMPANY . . . . GREAT NECK
SPICER MANUFACTURING DIVISION, DANA CORPORATION . . . . . TOLEDO
SPONGE RUBBER PRODUCTS COMPANY . . . SHELTON
SQUARE D COMPANY . . . . . DETROIT
STANDARD CONTAINER, INC. . . . . MONTCLAIR
STANDARD FORGINGS CORPORATION . . . CHICAGO
STANDARD MOTOR PRODUCTS, INC. LONG ISLAND CITY
STANDARD PRESSED STEEL COMPANY . JENKINTOWN
STANDARD PRODUCTS COMPANY . . . . DETROIT
STANDARD RAILWAY EQUIPMENT MANUFACTURING COMPANY . . . . . CHICAGO
STANDARD STEEL SPRING COMPANY . . CORAOPOLIS
STANDARD STOKER COMPANY . . . . NEW YORK
STANDARD TUBE COMPANY . . . . . DETROIT
STEARNS-ROGER MANUFACTURING COMPANY . DENVER
STEEL COOPERAGE COMPANY . . . . . DETROIT
STERLING MOTOR TRUCK COMPANY . . MILWAUKEE
STEWART-WARNER CORPORATION . . . . CHICAGO
STOCKHAM PIPE FITTINGS COMPANY . BIRMINGHAM
STONE & WEBSTER ENGINEERING CORPORATION . . . . . NEW YORK
STRATFORD ENGINEERING CORPORATION KANSAS CITY
STREICHER DIE & TOOL COMPANY . . . YPSILANTI
STRELINGER COMPANY, CHAS. A. . . . . DETROIT
STUART OIL COMPANY, D. A. . . . . CHICAGO
STUDEBAKER CORPORATION . . . . SOUTH BEND
SUN OIL COMPANY . . . . . PHILADELPHIA
SUPERIOR COACH CORPORATION . . . . . LIMA
SURFACE COMBUSTION CORPORATION . . . TOLEDO
SUSQUEHANNA MILLS, INC. . . . . NEW YORK

Honor Roll of Industrial Preparedness

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SWANK, INC. . . . . ATTLEBORO
SYLVANIA ELECTRIC PRODUCTS, INC. . . NEW YORK
SYMINGTON-GOULD CORPORATION . . . ROCHESTER

TABER INSTRUMENT CORPORATION NORTH TONAWANDA
TALON, INC. . . . . MEADVILLE
TENNESSEE COAL, IRON AND RAILROAD COMPANY . . . . . BIRMINGHAM
TENNESSEE CORPORATION . . . . . NEW YORK
TEXAS GULF SULPHUR COMPANY . . . NEW YORK
TEXTILE MACHINE WORKS . . . . . READING
THEW SHOVEL COMPANY . . . . . LORAIN
THOMPSON PRODUCTS, INC. . . . . CLEVELAND
TIMKEN-DETROIT AXLE COMPANY . . . . DETROIT
TIMKEN ROLLER BEARING COMPANY . . . CANTON
TIMMS SPRING COMPANY . . . . . ELYRIA
TITAN METAL MANUFACTURING COMPANY . BELLEFONTE
TITEFLEX, INC. . . . . NEWARK
TOKHEIM OIL TANK AND PUMP COMPANY FORT WAYNE
TRAILMOBILE COMPANY . . . . . CINCINNATI
TREADWELL CONSTRUCTION COMPANY . . MIDLAND
TRICO PRODUCTS CORPORATION . . . . BUFFALO
TROJAN POWDER COMPANY . . . . . ALLENTOWN
TROPIC-AIRE, INC. . . . . CHICAGO
TULSA WINCH DIVISION, VICKERS, INC. . . TULSA
TURNER BRASS WORKS . . . . . SYCAMORE
TWIN DISC CLUTCH COMPANY . . . . . RACINE

UNDERWOOD CORPORATION . . . . NEW YORK
UNEXCELLED CHEMICAL CORPORATION . NEW YORK
UNION CARBIDE AND CARBON CORP. . . NEW YORK
UNION METAL MANUFACTURING COMPANY . CANTON
UNION SWITCH & SIGNAL COMPANY . . SWISSVALE
UNITED AIRCRAFT CORPORATION . . EAST HARTFORD
UNITED-CARR FASTENER CORPORATION . CAMBRIDGE
UNITED CHROMIUM, INCORPORATED . . NEW YORK
UNITED ENGINEERING & FOUNDRY CO. . PITTSBURGH
UNITED METAL BOX COMPANY . . . . BROOKLYN
UNITED MOTORS SERVICE DIV., GMC . . . DETROIT
UNITED SHOE MACHINERY CORPORATION . . BOSTON
UNITED SPECIALTIES COMPANY . . . . CHICAGO
UNITED STATES PIPE AND FOUNDRY COMPANY . . . . . BURLINGTON
UNITED STATES RUBBER COMPANY . . . NEW YORK
UNITED STATES STEEL CORPORATION OF DELAWARE . . . . . PITTSBURGH
UNITED STATES STEEL SUPPLY COMPANY . . CHICAGO
UNITED TRANSPORTS, INC. . . . . OKLAHOMA CITY

VAN DORN IRON WORKS COMPANY . . CLEVELAND
VANCE COMPANY, J. A. . . . . WINSTON-SALEM
VEEDER-ROOT, INC. . . . . HARTFORD
VERSON ALLSTEEL PRESS COMPANY . . . CHICAGO
VICKERS, INC. . . . . DETROIT
VICTOR MANUFACTURING & GASKET CO. . . CHICAGO
VICTORY PLASTICS COMPANY . . . . . HUDSON
VIKING TOOL & MACHINE CORPORATION . BELLEVILLE
VISKING CORPORATION . . . . . CHICAGO
V-M CORPORATION . . . . . BENTON HARBOR
VONNEGUT MOULDER CORPORATION . INDIANAPOLIS

WAGNER ELECTRIC CORPORATION . . . ST. LOUIS
WAGNER MALLEABLE IRON COMPANY . . . DECATUR
WALTERS MANUFACTURING COMPANY . . OAKMONT
WALWORTH COMPANY . . . . . NEW YORK
WALZ & KRENZER, INC. . . . . ROCHESTER
WARD LAFRANCE TRUCK CORPORATION . . ELMIRA
WARNER ELECTRIC BRAKE MANUFACTURING COMPANY . . . . . BELOIT
WARNER & SWASEY COMPANY . . . . CLEVELAND
WARREN WEBSTER & COMPANY . . . . CAMDEN
WATERBURY COMPANIES . . . . . WATERBURY
WATERBURY FARRELL FOUNDRY & MACHINE COMPANY . . . . . WATERBURY
WAUKESHA MOTOR COMPANY . . . . WAUKESHA
WEATHERHEAD COMPANY . . . . . CLEVELAND
WEIRTON STEEL COMPANY . . . . . WEIRTON
WELDING ENGINEERS, INC. . . . . NORRISTOWN
WEST TIRE SETTER COMPANY . . . . ROCHESTER
WESTERN ELECTRIC COMPANY . . . . NEW YORK
WESTERN METALCRAFT, INC. . . . . OLYMPIA
WESTINGHOUSE AIR BRAKE COMPANY . . WILMERDING
WESTINGHOUSE ELECTRIC CORPORATION . PITTSBURGH
WETTLAUFER MANUFACTURING CORPORATION DETROIT
WHEELING STAMPING COMPANY . . . WHEELING
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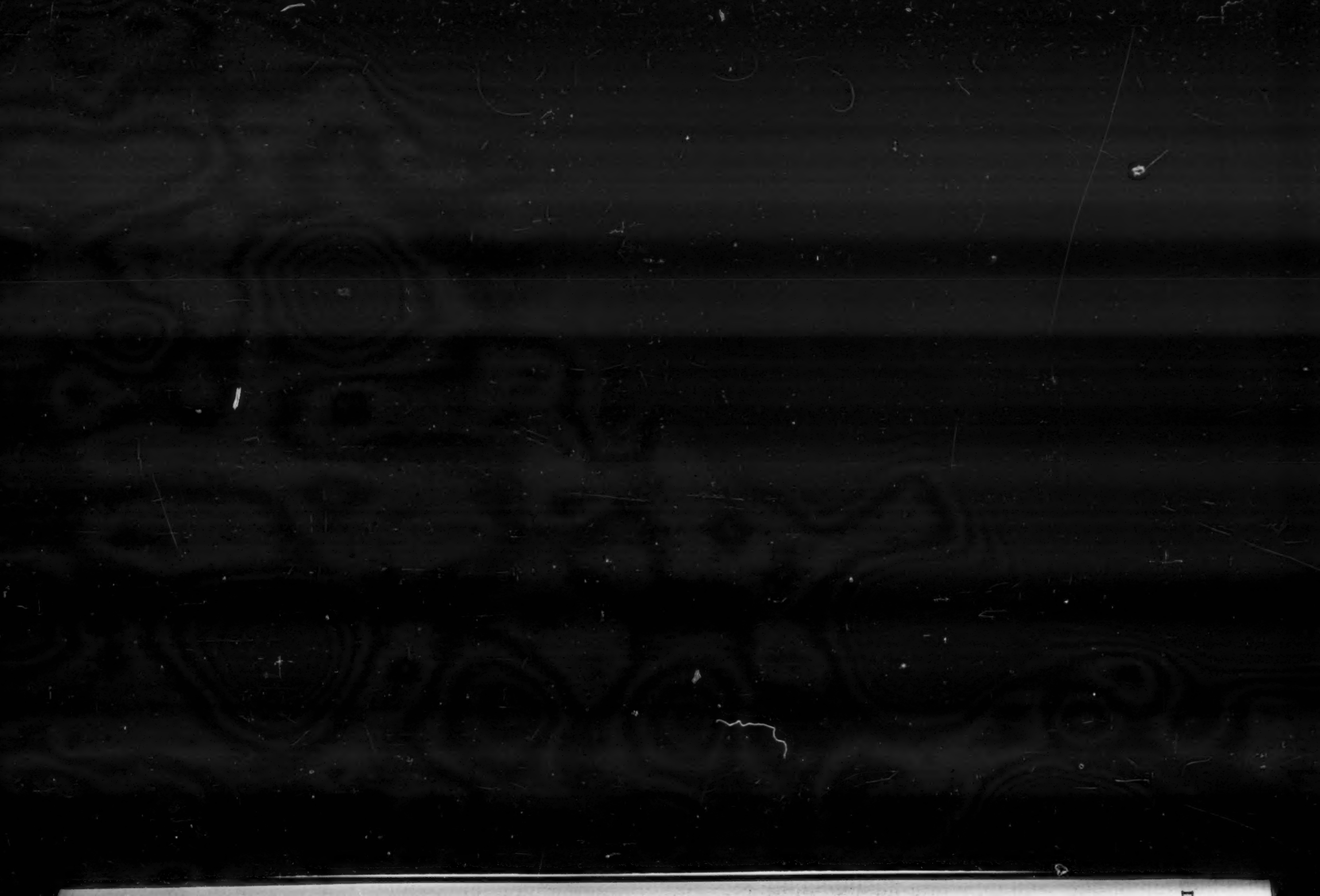

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ingly to pick the true highlights of the General's career—which is doubtless the reason for the satisfying qualities of this small, one-volume biography.

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Science at War. By J. G. Crowther and R. Whiddington, C.B.E., F.R.S. New York: Philosophical Society. 185 pp. $6.

THIS is a detailed account of the contribution of science to the war effort, based on official archives and documents assembled by the Scientific Advisory Committee to the British Cabinet. It was written by scientists with due regard to security but sufficiently complete and detailed so as to inform the technical reader as well as the layman.

It covers the subject of radar in detail and at some length. The sections on operational research and science and the sea bring out clearly many lesser known functions of science and contrast the German system of science utilization with that of the Allies. It covers the atomic bomb and the very early research in this connection.

In all the accomplishments of the Allies the superior methods of operating democracies are proved through extraordinary intimacy between deviser, user, and producer. Credit is given to the United States for a part in these accomplishments through development and production. However, the book is written by British authors, and Britain's part in the war is naturally more fully developed. This is a charming work, very instructive, and the manner of presentation, with the subtle humor of the British writer, calls for more books by similar authors.—THOMAS K. VINCENT.

The Rifle—Its Development for Big Game Hunting. By S. R. Truesdell. Harrisburg: Military Service Publishing Company. 274 pp. $5.

THE volume covers a considerably greater field than is indicated in its subtitle. Truesdell devotes his splendid introduction to the evaluation of the influence of the rifle on modern civilization and to its place in history. And throughout the book runs a generous commentary on the history of the weapon, both as a military and a civilian tool. Perhaps few of us realize the scope of civilian and military rifle shooting, both on design and development of gun and cartridge and their production in peace and war.

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